

TECHNICAL REPORT AND PROJECT HISTORY

ARCHITECTURAL AND ENGINEERING SERVICE

CONTRACT NOy 5614

P R E F A C E

ARCHITECTURAL AND ENGINEERING SERVICES  
REQUIRED FOR THE DESIGN OF LIGHTER-  
THAN-AIR FACILITIES AT TILLAMOOK, OREGON

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TABLE OF ADMINISTRATIVE DATA

I. GENERAL

Title:

Contract NOy-5614 - Cost-Plus-Fixed-Fee Contract for Architectural-Engineering Services between The United States of America and John W. Cunningham and Associates in connection with Construction Work at Naval Air Station, Puget Sound Area, Portland, Oregon.

Supplementary Agreements:

Supplementary Agreement #1, dated 9 October 1943:

<u>Project No.</u>	<u>Description</u>	<u>Original</u>	<u>Supplemental</u>	<u>Change</u>
13	Radio Transmitter Building	\$62,000.	\$ --	-\$62,000
16	Power Plant Building and Equipment	360,000.	380,000.	+ 20,000
25	Sewage Treatment Plant	80,000.	--	- 80,000
27	Ammunition Storage	100,000.	90,000.	- 10,000
27a	Inert Storage	--	10,000.	+ 10,000
41	Railroad Connection (addition)	--	15,000.	+ 15,000.
45	Dispensary (addition)	--	45,000.	+ 45,000.
46	Fire Station and Garage (addition)	--	11,000.	+ 11,000.
47	Utilities (addition)	--	200,000.	+200,000.
48	Helium Purification Plant	--	55,000.	+ 55,000.
49	Station Brig	--	10,000.	+ 10,000.

Total increase in scope over original contract.....\$214,000.

Type of Contract:

Cost-Plus-Fixed-Fee.

Name of Projects Under Contract:

<u>Project No.</u>	<u>Description</u>
1	Railroad Connection.
2	Clearing and Grading.
4	Mobile Mooring Masts and Services.



TABLE OF ADMINISTRATIVE DATA

I. GENERAL

Name of Projects Under Contract:

- |     |   |
|-----|---|
| 6   | Barracks (456 men).   |
| 7   | Messhall and Cold Storage.  |
| 8   | Bakery.   |
| 9   | Bachelor Officers' Quarters (100 officers).                           |
| 10  | Officers' Quarters (2).   |
| 11  | Recreation Facilities and Ship's Service.                             |
| 12  | Administration Building and Radio Receiving.                          |
| 14  | Dispensary (30 beds).   |
| 15  | Station Maintenance and Utility Shop.                                 |
| 16  | Power Plant Building and Equipment.                                   |
| 17  | Fire Station and Garage.  |
| 18  | Laundry.  |
| 19  | Gate House and Fence.   |
| 20  | Storehouse.   |
| 21  | Paint and Lubricating Oil Storage.                                    |
| 22  | Gasoline Storage and Distribution.                                    |
| 23  | Fuel Oil Storage.   |
| 24  | Utilities, including Telephone, Steam, Water,<br>Sewer, Fire Systems. |
| 26  | Roads, Walks and Paving.  |
| 27  | Ammunition Storage.   |
| 27a | Inert Storage.  |
| 28  | Dope Shop and Storehouse.   |
| 41  | Railroad Connection (addition).                                       |
| 45  | Dispensary (addition).  |
| 46  | Fire Station and Garage (addition).                                   |
| 47  | Utilities (addition).   |
| 48  | Helium Purification Plant.  |
| 49  | Station Brig.   |

Architect & Engineer:

John W. Cunningham and Associates, Spalding Building  
3rd and Washington Streets, Portland, Oregon.

Design Work Performed at:

Tillamook, Oregon and Portland, Oregon.

Source of Technical Personnel:

Portland, Oregon and Tillamook, Oregon.

Working Schedule:

An eight hour day six days per week.

TABLE OF ADMINISTRATIVE DATA

I. GENERAL

Insurance Company:

Oregon State Industrial Accident Commission.

Approval of Drawings:

Bureau of Yards and Docks and Officer-in-Charge  
of Construction.

TABLE OF ADMINISTRATIVE DATA

II. TIME

Letter of Intent or Notice to Proceed:

Letter of Intent dated 12 June 1942, received  
Tillamook 20 June 1942.

Contract Signed:

15 August 1942.

Preliminary Surveys Started:

7 July 1942.

Plans and Specifications Started:

14 July 1942.

Plans and Specifications Completed:

27 February 1943.

Field Work Covered by Plans and Specifications Completed:

20 February 1943.

As-Built Drawings Completed:

11 October 1943. Drawings were completed by office  
engineering force of Contractor, Contract NOy-5424  
(Sound Construction and Engineering Co.).

Administrative Office Work Terminated:

27 February 1943.

Close Out Completed:

18 August 1943.

Total Contract Time:

236 days.

TABLE OF ADMINISTRATIVE DATA

III. FISCAL DATA

Appropriations:

Appropriation 17X1204(7),  
"Public Works - Bureau of  
Yards and Docks"

Allotments:

Number 17X1204(7)-41	\$100,000.00	
" 17X1204(7)-41A	50,000.00	
Total Allotments		\$150,000.00

Estimates of Cost:

Original Authorizations	\$100,000.00	
Additional Authorizations	50,000.00	
Total Estimate of Cost		\$150,000.00

Actual Cost:

Net Architectural & Engineering Cost	\$118,325.65	
Architect's & Engineer's Fee	27,000.00	
Final Cost		\$145,325.65

% Design Cost of Construction Costs		3.6
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Statement of Underrun		4,674.3
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Actual Salvage Value of Property	4,277.51	
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Amount " " Lost to Contract by Transfer of Property Without Exchange of Funds	1,627.90	
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Total Possible Salvage Value of Property		5,905.4
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Total Value of Property Purchased		8,453.2
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## TABLE OF ADMINISTRATIVE DATA

### IV. PERSONNEL

#### NAVY

##### Officer-in-Charge:

Lt. Comdr. William J. Stribling (CEC)-V(S), USNR  
Date of Service: 29 June 1942 to 28 December 1942

Lt. Stoddard H. Martin (CEC)-V(S), USNR  
Date of Service: 28 December 1942 to 6 February 1943

Lt. Comdr. Earl F. Koerner (CEC)-V(S), USNR  
Date of Service: 6 February 1943 to 30 October 1943

Lt. Comdr. William I. Brown (CEC)-V(S), USNR  
Date of Service: 12 November 1943 to 17 December 1943

Lieut. (jg) Cornelius B. Harvey (CEC)-V(S), USNR  
Date of Service: 17 December 1943 to Close

##### Assistant Officer-in-Charge:

Lt. Wilfred Jupenlaz (CEC)-V(S), USNR  
Date of Service: 21 September 1942 to 13 February 1943

Ensign William A. Sidler (CEC)-V(S), USNR  
Date of Service: 21 September 1942 to 28 April 1943

Ensign Howard Grad (CEC)-V(S), USNR  
Date of Service: 18 September 1943 to Close

##### Miscellaneous Key Personnel Connected with Project:

Kenneth C. Danstrom . . . . .	Principal Inspector
Vern R. Buckmaster . . . . .	Navy Auditor
Bernard F. Stacy . . . . .	Navy Auditor

#### ARCHITECT & ENGINEER

Members of Firm:	John W. Cunningham
	F. W. Zeidlhack
	Carl E. Green

Project Manager in Field . . . . .	John W. Cunningham
Office Engineer . . . . .	C. A. McClure
Field Engineer . . . . .	George W. Kessler
Asst. Engineer-Water Supply . . . . .	E. G. Rice
Asst. Engineer-Sewage and Drainage . .	Thomas Smithson

TABLE OF ADMINISTRATIVE DATA

IV. PERSONNEL

Asst. Engineer-Electrical . . . . .	James P. Howell
Asst. Engineer-Electrical-Inside Wiring . .	George R. Pettingel
Asst. Engineer-Railroad . . . . .	James P. Larney
Chief Architect . . . . .	George H. Jones
Mechanical Engineer . . . . .	Thomas E. Taylor
Structural Engineer . . . . .	John R. Reiff
Chief Accountant . . . . .	Harry H. Daus
Bookkeeper . . . . .	Mrs. H. Rusher

OUTLINE OF NARRATION

I. AUTHORITY

A. Bureaus involved

Bureau of Aeronautics

Bureau of Yards and Docks

B. Original Directives on Need  
of Facility

Omitted in accordance with  
Circular Letter 290-43.

## OUTLINE OF NARRATION

### I. AUTHORITY

#### C. Brief Description of Facility

The Facility is an Air Station (Lighter than Air). It consists essentially of two wooden hangars 296 ft. by 1000 ft., both with leaf doors, landing circle, six mooring circles, helium storage and distribution, storehouses, administration building, recreation building, dispensary, bachelor officers' quarters, officers' mess hall, two officers' quarters, garage, laundry, central heating plant, enlisted men's barracks and mess hall, and other buildings, utilities and equipment necessary to operate such a station.



## OUTLINE OF NARRATION

### I. AUTHORITY

#### D. Authorization

Bureau of Yards and Docks authorization is contained in the letter of intent dated 12 June 1942, the contract that was signed 15 August 1942, and Supplementary Agreement #1 dated 9 October 1943.

## OUTLINE OF NARRATION

### II. GENERAL

#### A. Selection of Architect & Engineer

Recommendation for the selection of the architect & engineer was not made locally, but was made by the Bureau of Yards and Docks.

## OUTLINE OF NARRATION

### II. GENERAL

#### B. Letter of Intent or Notice to Proceed

Copy of the letter of intent to the architect & engineer dated 12 June 1942 is included in this section of the report.

C

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Y

## NAVY DEPARTMENT

## BUREAU OF YARDS &amp; DOCKS

NOy-5614

Washington, D.C.

June 12, 1942

## Subject:

Contract NOy-5614, June 12, 1942, Navy Department letter of intent to execute contract for engineering and or architectural services for the design of Lighter-Than-Air Facilities, Naval Air Station, Puget Sound Area, Portland, Oregon

## Enclosure:

(A) Four copies of this letter of intent.

## Gentlemen:

Acting under authority of an Act of Congress approved April 25, 1939 (53 Stat. 590, 592), authorizing the Secretary of the Navy to contract with outside engineers and architects whenever deemed by him to be advantageous to the national defense, without reference to the Classification Act of 1923 (42 Stat. 1488) as amended (5 U.S.C.ch.13), or to Section 3709 of the Revised Statutes of the United States (41U.S.C. ch.8), you are hereby requested to proceed immediately with engineering and/or architectural services required incident to the work indicated at the location given below, to the end that it may be completed in the minimum time possible.

NAVAL AIR STATION, PUGET SOUND AREA, PORTLAND, OREGON

Title of ProjectAppropriation

Engineering and/or architectural services for design of Lighter-Than-Air Facilities, at above Naval Air Station.

"Naval Appropriation Act, 1943"

It is proposed that a fair and reasonable fee shall be established after further information as to detailed requirements is available. The amount of fee which can be allowed for services of this nature is limited by law to not exceed six per centum (6%) of the estimated cost, as determined by the Secretary of the Navy, of the project to which the fee is applicable. A formal contract will be prepared and submitted to you for execution in due course.

In order to aid in the financing of this project prior to the execution of the formal contract, it is proposed to make you partial payments, if necessary, upon the terms and conditions to be incorporated in the contract, and as

Sheet 14a.

NOy-5614

recommended by the Officer-in-Charge of Construction, in amounts commensurate with the work and services executed and performed by you and with the actual cost to you of the work so executed and performed.

Payments under this contract may be assigned pursuant to the Assignment of Claims Act of 1940, and will not be subject to reduction or set-off for any indebtedness of the contractor to the United States arising independently of this contract.

This work will be performed under the jurisdiction of Lieut. Comdr. W. J. Stribling, (CEC)-V(S), USNR, who has been designated Officer-in-Charge of Construction Contract NOy-5424 whose address will be furnished at a later date.

Contract NOy-5614 has been assigned to this engineering and/or architectural contract.

It is requested that you indicate your acceptance hereof in the space provided therefor on the four enclosed copies of this letter of intent, and that you return to the Bureau the four copies with your acceptance noted thereon.

Very truly yours,

/s/ B. Moreell  
Chief of Bureau

John W. Cunningham & Associates  
Consulting Engineers  
1112 Spalding Bldg  
Portland, Oregon

cc: Commandant, Thirteenth Naval District  
cc: Superintending Civil Engineer, Area VII  
cc: Officer-in-Charge of Construction Contract NOy-5424

## OUTLINE OF NARRATION

### II. GENERAL

#### C. Purpose of Contract

To provide the Architectural and Engineering services for planning the general layout of the various units of the lighter than air station consisting of two hangars, and the preparation of plans and specifications for the buildings, utilities and equipment necessary to operate the station. In general, to act in a consulting and advisory capacity on all Engineering and Architectural matters pertaining to the proper and speedy completion of the project.

## OUTLINE OF NARRATION

### II. GENERAL

#### D. Scope & Description of Work

##### 1. Original

The following are a list of projects for which architectural & engineering services were to be rendered in accordance with the original contract:

<u>Project No.</u>	<u>Title</u>	<u>Est. Construction Co Incl. Contractor's</u>
1	Railroad connection	\$ 160,000
2	Clearing and grading	400,000
3	Bakery	30,000
10	Officers' quarters (2)	19,400
14	Dispensary (30 beds)	77,000
16	Power plant building and equipment	360,000
22	Gasoline storage and distribution	160,000
23	Fuel oil storage	27,000
24	Utilities, including telephone, steam, water, sewer, fire systems	800,000
25	Sewage Treatment plant	80,000
26	Roads, walks and paving	175,000

The following projects are standard plans requiring only design of foundation and fireproofing of roofs, if necessary, by the Architect-Engineer:

#4	Mobile mooring masts and services	45,000
6	Barracks (456 men)	161,000 ✓
7	Messhall and cold storage	150,000
9	Bachelor officers' quarters (100 officers)	175,000 ✓
11	Recreation facilities and ship's service	120,000

OUTLINE OF NARRATION

II. GENERAL

D. Scope & Description of Work

1. Original

<u>Project No.</u>	<u>Title</u>	<u>Est. Construction Co</u> <u>Incl. Contractor's F</u>
12	Administration building and radio receiving	\$ 90,000
13	Radio transmitter building	62,000
15	Station maintenance and utility shop	27,000
17	Fire station and garage	51,000
18	Laundry	43,000
19	Gate house and fence	32,000
20	Storehouse	100,000
21	Paint and lubricating oil storage	8,000
27	Ammunition storage	100,000
28	Dope shop and storehouse	20,000
	Total	\$3,472,400

\*Project #4 - While this is the official title of the project the masts have been designed and will be constructed by Naval Air Station, Lakehurst, N. J. The Architect-Engineer is primarily concerned with the mast anchorage, paving and services.



## OUTLINE OF NARRATION

### II. GENERAL

#### D. Scope & Description of Work

##### 2. Additional & Final

The following services were actually rendered by the Architect-Engineer in accordance with Supplemental agreement dated 9 October 1943:

<u>Project No.</u>	<u>Description</u>	<u>Est. Construction Cos</u> <u>Incl. Contractor's Fe</u> <u>Excl. of Arch.-Eng. F</u>
<u>Complete Design Work or Complete Construction</u> <u>plans as Indicated</u>		
1	Railroad connection	\$ 160,000
2	Clearing and grading	400,000
*4	Mobile mooring masts and services	45,000
*6	Barracks (456 men)	161,000
*7	Messhall and bakery	150,000
8	Cold storage building	30,000
*9	Bachelor officers' quarters (100 officers)	175,000
*9a	Officers' messhall	
10	Officers' quarters (2)	19,400
*11	Recreation building and ship's service	120,000
*12	Administration building and radio receiving	90,000
14	Dispensary (30 beds)	77,000
*15	Station maintenance and utility shop	27,000
16	Power plant building and equipment	380,000
*17	Fire station and garage	51,000
*18	Laundry	43,000
*19	Gatehouse and fence	32,000
*20	Storehouse	100,000
*21	Paint and lube oil storage	8,000
22	Gasoline storage and distribution	160,000
23	Fuel oil storage	27,000
24	Utilities (including telephone, steam, water, sewer, fire systems)	200,000

## OUTLINE OF NARRATION

### II. GENERAL

#### D. Scope & Description of Work

##### 2. Additional & Final

<u>Project No.</u>	<u>Description</u>	<u>Est. Construction C Incl. Contractor's Excl. of Arch.-Eng.</u>
25	Sewage treatment plant (project cancelled)	
26	Roads, walks, paving	\$ 175,000
**27a	Inert storehouse	10,000
41	Railroad connection (addition)	15,000
45	Dispensary	45,000
*46	Fire station and garage (addition)	11,000
47	Utilities (addition)	200,000
48	Helium purification plant building equipment, estimated \$20,000 designed and provided by others	55,000
*49	Station brig	<u>10,000</u>
Total		\$3,576,400

\*Projects undertaken by the Architect-Engineer in preparation of complete construction plans. Although actual information is not available to the Bureau, this does not indicate a redesign, but rather, a complete redrawing of plans based on those submitted to the Officer-in-Charge by the Bureau upon initiation of the work in the field.

\*\*This project is listed separately by the Architect-Engineer. However, it was the Bureau's intention that this was included in the scope of Project 9.

\*\*\*This building was intended to be adapted along with others. However, the Ordnance Division of the Bureau altered the size of the building so that standard plans available did not apply and design in the field was necessary.

Projects adapted from standard plans, requiring only redesign of foundations, and fire-proofing of roofs, if necessary

## OUTLINE OF NARRATION

### II. GENERAL

#### D. Scope & Description of Work

##### 2. Additional & Final

<u>Project No.</u>	<u>Description</u>	<u>Est. Construction Cos Incl. Contractor's Fe Excl. of Arch.-Eng. F</u>
27	Ammunition storage (Original Bureau estimate was \$100,000 but allowance is made for project 27A for \$10,000)	\$ 90,000
28	Dope shop and storehouse	20,000
		\$ 110,000

#### Projects designed by the Bureau with no services Performed by the Architect-Engineer.

3	Hangar (6 ships)	2,000,000
5	Helium storage and distribution	225,000
29	Pigeon loft	6,000
30	Incinerator	10,000
31	Hangar (6 ships) (addition)	2,000,000
42	Helium storage and distribution (addition)	243,000
		\$4,486,000

#### Projects authorized subsequent to initial con- struction, on which available plans were used unchanged

43	Barracks (addition)(plans for project 6 used)	\$ 60,000
44	Bachelor officers' quarters (addition) (plans for project 9 used)	90,000
		\$ 150,000

OUTLINE OF NARRATION

II. GENERAL

D. Scope & Description of Work

2. Additional & Final

Project No.

Description

Est. Construction Co  
Incl. Contractor's F  
Excl. of Arch.-Eng.

The Architect-Engineer performed no work  
on the following project

13      Radio transmitter building      \$    62,000

Surveys and Field Engineering

Description

Actual Cost

Office and design engineering (labor)

\$ 1,390.81

Field engineering (labor)

37,749.78

Material and supplies, including instrument  
rentals, etc.

2,784.13

\$41,924.72

## OUTLINE OF NARRATION

### II. GENERAL

#### E. Sources of Design Data Utilized

The Contract for Architect-Engineer services indicated that the required work related to the grading, services and utilities, and that standard plans would be furnished for nearly all buildings. A small-scale layout of the project, prepared in the office of the Bureau of Yards and Docks, was furnished.

After the Engineers and Contractor had arrived on the job, plans for four or five of the buildings at the South Weymouth Naval Air Station were received through the 13th Naval District Office, Seattle. The Officer in Charge immediately requested a full set of all required standard plans.

Subsequently, over a period of three months, additional drawings were received from time to time, mainly of buildings constructed for eastern stations. The only adaptable plan received was for the barracks. Following discussion with the Superintending Civil Engineer, authority was given to proceed with detailed design of buildings as required. In preparing these designs reference was made to all information at hand, and an effort was made to conform to approved Navy styles and requirements. The general adopted site layout conformed to the sketch furnished by the Bureau, being changed only as necessary to fit the site topography and characteristics.

Designs were made in conformity to general engineering practice as expressed in the standards of

## OUTLINE OF NARRATION

### II. GENERAL

#### B. Sources of Design Data Utilized

such agencies as the Public Roads Administration, Joint Committee on Concrete and Reinforced Concrete, Rural Electrification Administration and various City building codes. Some use was made of design data for other military establishments previously handled by the Architect-Engineer and various municipal projects for which they had served as engineers.

In preparation of project specifications, reference was made wherever practical to the Federal Standard Stock Catalog and U. S. Navy department, Bureau of Yards and Docks Specifications.

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### A. Preliminary Studies

##### 1. Surveys

##### a. Site

The site comprises an area of some 2,000 acres located about four miles south of Tillamook, Oregon, lying between the Coast Highway (US No. 101) on the south and west and Long Prairie Road on the north. A short distance west of the area is the Tillamook River. The Trask River flows west just north of the area. These rivers flow northerly into Tillamook Bay some four miles north of the reservation. About 40 per cent of the area at the northerly and westerly sides was cleared and used for pasture; the central area was a dense thicket of brush, vine maple, and alder. Near the east end of the tract a ridge rising some 300 feet above the surrounding flat lands is covered with heavy stands of vine maple, alder, spruce, and some fir. From this ridge several small streams drain north and west through the reservation. The general elevation of the flat lands is between 25 and 50 feet above sea level; a low area around elevation 10 to 20 is found near the northwest corner of the area. A slight ridge traverses the site from southeast to northwest dividing the natural drainage--the northerly portion into the Trask River and the remainder into the Tillamook River through Anderson Creek. The westerly third of the station area had previously been acquired and was in process of development as a County airport with funds provided by the Civil Aeronautics Authority and construction handled by the U. S. Army.

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### A. Preliminary Studies

##### 1. Surveys

##### a. Site

The Corps of Engineers of the Army had made a topographic map covering the entire area on a scale of 1" - 200'. While this map was found to be of great assistance, further and more accurate topographic surveys were necessary prior to design on specific areas of intensive development. Following preliminary locations of roads and facilities accurate cross-sections were taken. The connecting railroad line from Tillamook to the station area was located in conformity to standard railway engineering practices.



## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### A. Preliminary Studies

##### 1. Surveys

##### b. Subsurface

This site, especially the area where the buildings and operation facilities are located is on what was once the southerly end of Tillamook Bay. Through sedimentation and numerous changes in the location of the rivers flowing through the area, the entire Tillamook valley below the 100 foot contour is spotted with gravel bars, filled-in river beds, and deep deposits of silts and clay--no definite pattern of formation being apparent. Surface indications were of little help in the determination of subsurface conditions. Only after extensive excavation was it possible to establish a general idea of what was to be generally expected. After clearing, some areas that were expected to be quite wet dried up due to improved drainage, while other apparently stable sections developed into almost bottomless clay pits when the surface sod was removed. This condition was quite pronounced along some sections of Blimp Boulevard, around Hangar "B", and over some portions of the landing mat. Several fairly good gravel banks were uncovered during the course of operations.

The facilities for which more thorough subsurface investigations were made were the two hangars. Several test pits were dug; later, drillings were made, and the results were transmitted to the Bureau of Yards and Docks.

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### A. Preliminary Studies

##### 1. Surveys

##### c. Available Utilities

As this reservation is located in an agricultural district, no existing utilities with the exception of water supply were available. Fortunately, the main supply pipe lines of the Tillamook City water system pass through the reservation. At small expense it has been possible to tap these lines and develop a suitable system for the entire area, including gravity flow to a storage reservoir on the ridge east of the operations area.

Although the local power company serving Tillamook with electricity has distribution lines adjacent to the reservation, their generating capacity was not sufficient to meet both local demands and the large connected load on the reservation. Investigation of possibility of expansion of this plant to meet required needs indicated this to be impractical. It would have required a large amount of critical material, even if second-hand equipment were used, for principal units. Furthermore, the station would be left with only a single source of supply, none too reliable in characteristics, and would be forced to install its own standby generating unit. After due and careful consideration, decision was made to contract with the Bonneville Power Administration with the understanding that they would arrange with the local company for an interconnection and standby service. This plan made necessary the construction

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### A. Preliminary Studies

##### 1. Surveys

##### c. Available Utilities

by the Bonneville Administration, of about 30 miles of 57 Kv. transmission line, which is of ample capacity for any reasonable expansion of the station requirements.

Special sanitary sewer and drainage and storm sewer systems were designed to serve the station area.

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### A. Preliminary Studies

##### 1. Surveys

##### d. Soil Mechanics

As previously stated, the delta formation of this area developed problems of soil conditions and foundation bearings under almost every structure of any size. The investigations for the hangar foundations, hereinabove referred to, included the taking of undisturbed samples in the drill holes and making loading tests on the formations at the elevations where footings were proposed. The Architect-Engineer aided in these tests, but interpretation was done in the Bureau office at Washington.

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### A. Preliminary Studies

##### 2. Investigations

With respect to the road and runway sub-grades, density and compaction tests were made by means of the Proctor cylinder. Various shrinkage tests were made. It was found that the clay soils would shrink as much as 12 per cent in dimension or 75 per cent in volume with air drying.

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### B. Design Criteria

In general, the unit stresses used were those indicated by the Joint Committee recommendation for concrete structures, American Institute of Steel Construction for structural steel work, and the City of Portland, Oregon building code for timber construction except that unit stresses were increased in conformity to directives of the Bureau of Yards and Docks wherever any appreciable saving of critical materials could be made by such procedure.

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### C. Design Procedures and Methods Utilized

Under the letter of intent and contract it appeared that the work was primarily related to grading and utilities. In the interest of economy and efficiency and to secure close coordination with the field work, it was decided to set up a branch engineering office at the site and do substantially all of the designing at that point. Later, it developed that most of the buildings had to be designed or re-designed. Architects and architectural draftsmen were not available for employment in Tillamook and, accordingly, this part was done in the office of John W. Cunningham and Associates at Portland. The architectural staff at the peak of that operation consisted of 11 men.

One specialty not covered by the original staff and organization of the Architect-Engineer was heating and ventilating. Because of the increased industrial development of the Pacific Northwest area there was a shortage of qualified men available for salary employment. Request was made for authority to subcontract the heating and ventilating to a qualified consulting engineer, but this request was denied. Finally, after some delay, an arrangement was made with a consulting engineer to handle the work on an hourly basis. This did not prove satisfactory. The approved basis of compensation was less than is customarily paid for such work on a fee basis,

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### C. Design Procedures and Methods Utilized

and there was a tendency to give other more remunerative work the priority. The heating and ventilating was the only phase of the Architect-Engineer's work on which there were any substantial delays, and these, while annoying, did not in any case determine the completion of an essential project.



## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### D. Design Operations

Although the architectural plans were prepared in Portland they were closely coordinated with the field office and with construction operations. The chief architect visited the site occasionally and consulted with the engineering staff, the Officer-in-Charge, and the Construction Contractors. Contact was maintained with the purchasing division of the Construction Contractors to ascertain which materials as required by original design were not available and what could be secured as substitutes. At all times a schedule was maintained that would not delay construction. Plans for the various units were prepared in accordance with a program outlined by the Officer-in-Charge.

The Dispensary was designed and final plans prepared after consultation with Navy Medical Officers who would operate it. The site for the Dispensary was changed several times before one that would best meet all requirements was selected.

The Recreation Building for enlisted men was planned to meet specific needs of the station. Construction was held up for some time when there was doubt regarding Navy policy on such facilities.

The Officers' Mess was planned after consultation with the Officer-in-Charge and the Commanding Officer of the station.

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### D. Design Operations

The gasoline and oil storage facilities were planned from data supplied but revised to meet the road and railroad conditions as located.

No unusual design features were encountered in any of the structures planned, but several interesting problems relating to drainage were encountered in the design of the mooring circles and landing area.

The requirements for each of the mooring circles called for a circle having a 300 foot radius, a paved surface on a slope not to exceed 1 per cent, and to be connected to similar circles by taxiways also on a 1 per cent or flatter slope. These requirements necessitated extensive studies in grading to keep down excessive excavation, to meet drainage requirements, and to locate the circles in order to prevent interference with other operations.

Several different studies were made relative to the drainage of these circles. Two plans were finally adopted. On circle number two a truncated cone design with a flat area of about 20 foot diameter in the center and slope to the circumference of the circle was used. Circles numbers one and three were built as inclined planes with a flat area in the center to provide for operation and servicing of blimps at a point where flooding would not occur. Observation during heavy rains indicated very satisfactory operation of both plans.

Outside the circles the drainage gathered in shallow open ditches or in some instances in culverts or "French Drains". The short run-off distance from center to edge of the circles did not tend to accumulate an excessive

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### D. Design Operations

Several changes in water main locations were necessary because of relocation of some of the buildings; however, the Architect-Engineer's plans, and the necessary location surveys, were kept in advance of the construction contractors.

A complete sanitary sewer system plan, including a sewage treatment plant, was designed. The main trunk sewer passes through a ridge, requiring a deep cut in order to reach the proposed treatment plant on the bank of the Trask River. Laterals were provided to every building with wyes left at any point where another building was anticipated for future construction. All sewer plans were completed and lines staked in advance of construction needs.

The fact that the building area of the station was only about 50 feet above sea level, and the long distance to the outlet on Trask River necessitated somewhat flatter grades than would normally be used, brought about some close clearances with other underground utilities. Where the level and grade, as furnished by the Architect-Engineer, was followed there was little difficulty.

The Trask River, opposite the Station, is a fine clear mountain stream noted for its runs of salmon and other game fish. It is not used for domestic water supply, but traverses a dairy country with pastures abutting from which stock have access to the water. Treatment of sewage is deemed essential but, after discussion with sanitary authorities, it was decided that primary treatment by sedimentation followed by sterilization of the effluent, would be adequate for a wartime operation. The plant designed is for sedimentation in a mechanically cleaned tank with

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### D. Design Operations

quantity of water. However, on the landing mat with a radius of 1000 feet the problem became more involved. A brief description of the final plan adopted for this drainage is given under heading H - "Unusual Features of Interest to Future Design".

The City of Tillamook water supply pipe lines traversing the reservation consisted of one old line of 18 inch wood pipe and a relatively new 12 inch steel pipe. These pipes were so located that they would be under the paved landing circle and were quite close to the surface. In order to insure no future difficulty from pipe failure, which would necessitate the digging up of the landing mat pavement, it was decided to replace the wood pipe with a new 18 inch steel pipe and to relay the existing 12 inch steel pipe at a greater depth below the finished grade of the landing mat.

This operation was carried out with a minimum of inconvenience or impairment of service to the City of Tillamook. The wooden line was not disturbed until necessary materials for replacement were on hand. After the wood pipe was replaced the other line was taken up and stock-piled until the removal of the spoil material under the proposed landing mat was far enough advanced to permit relaying without the necessity of excavating a special trench.

During the change over of the Tillamook pipe lines very careful checks were made to insure no contamination of the water, and samples were constantly taken and sent to the State Department of Health for analysis. This procedure was followed with all water installations throughout the reservation.

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### D. Design Operations

separate digestion of the sludge in a heated digester. The settled sewage effluent will be chlorinated. In view of the experience in other stations, where increased assignments have placed an overload on sewage treatment facilities, the plant was liberally designed for an ultimate population of 1,500. By order of Bureau of Yards and Docks, construction of the sewage treatment plant will be deferred for the duration of the war.

The Architect-Engineer contract did not provide for inspection during construction; however, as far as possible, the work was watched and any deviations from the plans noted and if deemed necessary brought to the attention of the Officer-in-Charge.

The soil conditions on this station prevent any great amount of ground absorption. While the short time rates of rainfall are not exceptionally high, the rain is fairly continuous over long periods, and comes during the winter season when there is a minimum of evaporation, resulting in a high runoff factor. These conditions made it imperative that a rather complete drainage and storm sewer be provided, although this was not called for in the original plans and estimates.

A ridge, running easterly and westerly just south of the administration and housing area, divides the station into two sections. Both of these receive drainage from higher areas on the hill, and the southerly section also receives drainage from tracts lying outside of the station to the southeast. This hill water has been picked up by intercepting ditches; the northerly one running to Brickyard Creek, which is a tributary of the Trask River, and the southerly one cutting diagonally across to the southwest to an ultimate discharge into the Tillamook River. In addition

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### D. Design Operations

to these intercepting ditches, the developed area of the Station has been provided with a system of storm sewers of concrete pipe, with inlets from roadside ditches corresponding to an ordinary municipal storm sewer system. The storm sewers also have two outlets. The area of the Administration Building, Barracks and Officers' Quarters is drained north-easterly, with a 36 inch pipe outfall into Brickyard Creek. The hangar and operation area, and also the landing area, have another storm sewer system of greater extent and capacity, discharging into two large 48 inch pipes which traverse the landing area and airport runways to an outlet on South Prairie Creek, which ultimately flows into the Tillamook River.

The construction of this storm sewer system did not develop any problems out of the ordinary, except that some difficulty was encountered in manhole construction. The contractor was unable to secure experienced help to build round manholes; therefore, the Officer-in-Charge authorized the building of square concrete manholes. During the early period of construction considerable delay and trouble was experienced by heavy rains flooding construction areas. This, however, was overcome almost entirely upon completion of the storm sewer and the construction of temporary drainage ditches as directed by the Architect-Engineer.

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### E. Major Difficulties Encountered

No unusual difficulties were encountered except in building and maintaining an organization and doing the work under continuous high pressure for speed. The construction contract was awarded in advance of the Architect-Engineer contract, and the construction contractor immediately began to move in equipment and personnel. He was able to hasten the actual start of his work by subcontracting the clearing to an organization with equipment ready to start operations. These circumstances made it imperative that the engineers lay out certain work at once, even before clearing had progressed to a stage where surveys could be effectively made. Thereafter, there was always pressure to keep ahead of the contractor. Work was planned and laid out to utilize all construction equipment and personnel that was available.

Up to the end of October, 1942 weather conditions were favorable. Thereafter, particularly through November and December, very heavy rainfall handicapped all field work.

The Pacific Northwest was, through the entire period of this operation, one of the most critical areas of labor shortage in the United States. This shortage extended to engineering and technical employees. Housing conditions in Tillamook were quite unsatisfactory. For these reasons, it was found difficult to secure and

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### B. Major Difficulties Encountered

hold the trained engineering help desired; this applied to both field and office help. Difficulty was encountered throughout the work in securing instrument men with sufficient training to carry out the work without more than usual supervision.

Although from time to time really good draftsmen were secured, because of the draft and opportunities in the various industries, it was difficult to retain them on this work. Some local help was secured and after assistance and training developed into reasonably good draftsmen.

Draftsmen for the architectural design work were employed in Portland and even there it was difficult to secure as many as needed.

Through the first six months of operation the average employment of all help, architectural, engineering, both office and field, and clerical help, averaged 37 per week. The peak of employment was during the last three weeks of August with an average of 70 per day. The maximum employment was 74 for two days.

Beginning about January first, the staff declined rapidly, especially in the field force, until in the latter part of February the entire force was only 10 or 12.

The technical supervisors on this project consisted of specialists for each of the various engineering and architectural units of the work such as drainage, sanitation, water supply, electrical distribution, steam generation and distribution, soil tests and foundation studies, structural design, general surveys, etc.

In keeping with Navy directives, this project was organized on a forty-eight hour week basis, straight time being paid for forty hours and overtime for the additional eight hours. Key person-



## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### E. Major Difficulties Encountered

nel were paid on a straight weekly basis with no allowance for overtime. There was very little work performed in excess of the forty eight hour base except by those on a straight weekly salary.

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### F. Progress

From the beginning of the work, early in July 1942 until completion in February 1943, the progress was continuous and in advance of construction requirements. The appended condensed progress graph indicates elapsed time between beginning of surveys and completion of plans ready for approval of Officer-in-Charge. With respect to the buildings, a unit once started was generally carried through to completion although the Dispensary, the Recreation Building and the Laundry were held up for instructions from Washington or information regarding equipment. The chart indicates that the design of utilities, such as water and sewers, was continued over a lengthy period. This was true with respect to the projects taken as a whole because they were handled by units, to conform with construction progress. In the case of sanitary sewer, for example, the outfall and connection to the Administration Building, Barracks, and Bachelor Officers' Quarters was planned and laid out for construction very early in the job. Some of the minor laterals and branches were held up until near the end, due partly to pressure of other work and partly lack of final decision on some detail.

From the start of this project a procedure was worked out, in cooperation with the Officer-in-Charge, whereby a comprehensive check was made on all drawings before final approval.

The preparation of each drawing was under direct supervision of the Architect-Engineer technical

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### F. Progress

supervisor of the section of work to which it pertained. The drafting was done in a general drafting pool, under direction of an Office Engineer. After a preliminary drawing was completed, checked and approved by the Section Head, a final tracing was made. This tracing, after inspection, was approved by the Architect-Engineer Representative and forwarded to the Officer-in-Charge where it was inspected and any changes, errors or omissions noted by his technical advisors. It was then returned to the Architect-Engineer with a memorandum regarding changes, etc., and, unless the suggested alterations were of major importance, they were made as requested, the revised drawing approved by the Architect-Engineer and sent to the Officer-in-Charge for final approval. If, however, any suggested revision was of a basic character the interested parties would confer with the Officer-in-Charge, or his representative, and the subject discussed before any action was taken. This procedure tended to provide coordination of the various plans not only in design but also in construction.

The first survey work was begun on July 8, 1942, but, because of the difficulty in securing help, intensive work with a number of survey parties did not start until several days later. From July 15th field work was conducted with from one to eight field parties, depending upon construction requirements. Upon direction of the Officer-in-Charge, as of October 1st all work relative to staking building locations, establishing line and grade for utilities, roads, etc., was assigned to the Construction Contractor, based on plans prepared by the Architect-Engineer. Field work after that date, in so far as conducted by the Architect-Engineer, applied to basic surveys, property line locations, etc. However, there was continuous cooperation with the construction contractors and, whenever necessary, assistance was given to expedite the work. In general, plans and specifications were begun

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### P. Progress

on the various phases of the work almost as soon as field work. However, because of delays in receiving basic data pertinent to some portions of the work, and, because of inability to secure sufficient competent technical help, some of the work was delayed. For progress data relative to the various units of work see CONDENSED PROGRESS GRADE.

In almost every instance on plans and specifications relating to the various buildings, there were delays caused by substitution of materials, to comply with priority regulations or availability of materials usually used. In several instances plans were revised or redrawn after first plans had been completed.

As previously noted, all remaining survey and staking of buildings, utilities etc., was taken over by the Construction Contractor as of October 1, 1942. However, other field work relating to property lines, boundary fence and minor preliminary surveys was continued to completion by the Architect-Engineer.

The design work in the Tillamook office gradually tapered off after January 1, 1943, and this office was closed on February 28th, except for rearrangement of files and checking over supplies, which required the services of the Office Engineer until March 3rd. After that there was a small amount of work done in the Portland office on the re-design of the fuel handling system, for which the drawings were forwarded to Tillamook on March 12th.

A complete set of prints of all construction drawings was assembled and, with two sets of all project specifications, was turned over to the Officer-in-Charge of Construction on March 3, 1943.

All original tracings, and all field note books and small computation books have been arranged,

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### F. Progress

indexed and filed in the custody of the Officer-in-Charge of Construction at Tillamook. Correspondence files and accounting records are, at the date of this report, still at Tillamook, but when no longer needed by the Navy Auditor will be shipped to Portland and preserved in the office of the Architect-Engineer, in conformity to the contract.

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### G. Materials

Even before receipt of directives relative to the conservation of critical materials it was realized that there would be a need not only to conserve some types of materials, but that all design work would be influenced by the necessity of substitution for materials available. Considerable saving was made in materials such as galvanized iron, copper, reinforcing steel and plywood. By the use of wood for roof gutters and down spouts, galvanized iron was eliminated and composition wall board was used extensively in place of plywood, etc.

In most instances the substitution of materials did not materially affect design, except in some cases where a heavier load was encountered or, as in the case of composition wall board, where additional back support was necessary. It did, however, delay specification writing pending determination of what materials were available.

The major problems of material shortage were encountered in heavier construction, especially in electrical equipment. Here it was not only a case of trying to save or eliminate critical materials, but also the problem of substitution because materials specified were not available when needed.

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### H. Unusual Features of Interest to Future Design

The Architect-Engineer contract, and information furnished, did not apparently contemplate any special drainage or storm sewerage problem. The climate at Tillamook, while characterized by relatively heavy annual rainfall, does not involve storm conditions or rates of rainfall in excess of those in other parts of the United States, so it would appear that drainage and storm sewerage must have been found necessary elsewhere. In the final designs, the building area was provided with a complete system of inlets and storm sewers, conforming to municipal practice and not involving any special features. The drainage of the landing mat did, however, present a problem which was new to the Architect-Engineer, and possibly deserves discussion at this point.

The restrictions as to grades on the landing mat were the same (not to exceed one percent) as for the mooring circles. The two hangars adjacent to the mat were located at right angles to each other, but with a three foot difference in elevation. This somewhat complicated the grading and drainage problem.

To conform to the surface topography and minimize grading, the landing mat was laid out as two intersecting inclined surfaces. It was to be paved with an impervious asphaltic pavement. Obviously, the runoff from such an area would be very considerable in the total, and, if allowed to accumulate from the high side to the low side of the area, a distance of 2,000 feet, would be quite a depth of water. It seemed obvious that

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### H. Unusual Features of Interest to Future Design

this should be intercepted and collected by some form of transverse collecting drains running at right angles to the slope. The exact design of these drains was a matter for many studies. Depressions or gutters were considered but dismissed because of interference with operations. Various forms of porous drains were proposed. Final decision was for shallow concrete intercepting troughs covered with wooden gratings (to be later replaced with permanent materials) and having discharge openings at intervals leading to a system of pipe drains under the pavement. These drains lead into two 48 inch truck lines which converged into a junction box or equalizer that in turn connected with two 48 inch pipes constructed under the Heavier-than-Air runways by the U. S. Army Engineers. From this point drainage was in an open ditch into a natural drainage channel and thence into the Tillamook River.



## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### I. Record As-built Drawings

The Architect-Engineer had an architectural draftsman inspect the various buildings and make changes on original tracings in order that the final plans would incorporate any minor changes made during construction. This procedure brought building plans up to date as of February 15, 1943, or shortly before the Architect-Engineer contract terminated.

The following is a list of plans submitted to the Officer-in-Charge of Construction:

TABULATION OF FINAL DRAWINGS  
as prepared by  
ENGINEERS ARCHITECT

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12

ADMINISTRATION BUILDING--16 sheets.  
27 Foundation plan-First floor plan-details.  
28 Second floor plan-Third floor plan.  
29 First floor framing plan-Second floor framing plan - Roof framing plan.  
30 Elevations.  
31 Miscellaneous details.  
32 Structural section.  
33 Main entrance details.  
34 Porch and dormer window details.  
35 Stair details.  
36 Millwork details.  
49 Plumbing and heating foundation and first floor plans and details.  
50 Plumbing and heating second and third floor plan and details.  
51 Electrical plans foundations and first floor.  
52 Electrical plans second and third floors.  
98 Antenna mast and tower mast details.  
193 Antenna mast details.

27

Numerous miscellaneous sketch details.  
AMMUNITION STORAGE--4 sheets.  
270 Magazine grading plan-Small arms-Pyrotechnics-Inerts.  
267 Magazine grading plan-High explosives.  
408 Inert storehouse plans-Elevations-Sections-Details.

9

148 Ammunition road-plan and profile.  
BACHELOR OFFICERS QUARTERS (Senior)--8 sheets.  
61 Plans and details.  
62 Elevations and sections.  
63 Construction details.  
64 General details.  
99 Heating plans and details.  
66 Plumbing plans and details.  
67 Electrical plans and details.  
85 Revised foundation plans.

9

Various sketches for study purposes.  
BACHELOR OFFICERS QUARTERS (Junior)--6 sheets.  
53 Plans and details.  
54 Elevations and details.  
55 Framing details.  
56 Plumbing and heating plans and details.

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	57	BACHELOR OFFICERS QUARTERS (Junior)--6 sheets
	85	Electrical plans.
		Revised foundation plans.
9A	213	BACHELOR OFFICERS MESS HALL--13 sheets.
	271	Foundation plan-Details-Plot plan.
	272	First floor plan.
	273	Elevation and sections.
	274	Ceiling joist framing.
	275	Roof framing plan-Sections and details.
	276	Trusses and sections.
	291	Interior details.
	290	Window and card room details.
	286	Miscellaneous cabinet details.
	284	Galley fixtures and cooler room.
	283	Heating and plumbing-First floor plan.
	288	Heating and plumbing-Foundation plan.
6		Electrical plans and details.
	43	BARRACKS--7 sheets.
	44	Plans and details.
	45	Elevations and sections.
	46	Miscellaneous details.
	59	Construction details.
	58	Electrical details.
	60	Plumbing plan.
40		Heating plans and details.
	397	BRIG--3 sheets.
	398	Foundation and floor plans-Details.
	399	Elevations-Exterior details.
		Electrical plans and details-Plumbing and heating.
16		CENTRAL HEATING PLANT--11 sheets.
	477	Plans and details.
	475	Elevations and sections.
	476	Scale details.
	478	Framing details.
	479	Framing elevations.
	480	Roof framing.
	484	Plumbing and electrical plans and details.
	481	Mechanical details.
	482	Mechanical plans.
	483	Mechanical details etc.
	501	Section.
7A		COLD STORAGE--4 sheets.
	142	Plans.
	143	Elevations and sections.
	187	Details.
	218	Refrigeration and electrical plans.

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14		DISPENSARY--18 sheets.
	309	Basement and foundation plans.
	414	First floor plan.
	415	Elevations.
	416	First floor framing.
	417	Ceiling framing plan.
	418	Roof framing sections.
	419	Window details.
	420	Ambulance entrance.
	421	Details of entry no. 1.
	466	Miscellaneous interior details-laboratory furniture.
	487	Fixed furniture details-Pharmacy, Dental etc.
	461	Fixed furniture details-X-ray, Physics, Utility etc.
	422	Basement plumbing plan.
	447	Plumbing details.
	445	Basement heating plan.
	446	Plumbing and heating plans and details.
	450	Electrical plans and details.
	464	Boiler setting details.
		Various sketches for study purposes.
28		DOPE STORAGE--1 sheet.
	504	Plans-Elevations-Details.
17		FIRE STATION--6 sheets.
	152	Plans and Details.
	153	Elevations and sections.
	154	Details.
	155	Interior details.
	156	Plumbing and heating.
	207	Electrical details.
17A		GARAGE AND REPAIR SHOP--3 sheets.
	373	Plans elevations and details.
	156	Plumbing and heating.
	207	Electrical details.
19		GATEHOUSE AND FENCE--4 sheets.
	93	Plans-Elevations-Sections and details.
	193	Grading plan.
	444	Boundary fence location map.
	390	Fence and gate details.
18		LAUNDRY--7 sheets.
	298	Foundation plan and sections.
	299	Floor plan and elevations.
	335	Exterior and interior details.
	296	Plumbing and heating foundation plan.
	297	Plumbing and heating plans and details.
	337	Electrical plans and details.
	334	Laundry machinery connections.

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133  
134  
136  
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186  
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216

MEN'S MESS HALL--9 sheets.

Foundation plans and details.  
First floor plan.  
Elevations and sections.  
Roof framing plans and details.  
Miscellaneous details.  
Galley-Bakery-Scullery details.  
Heating-Plumbing-Refrigeration foundation plan  
Heating-Plumbing-Refrigeration first floor plan  
Electrical plans and details.

10

307  
308  
380  
309  
311

OFFICERS QUARTERS Residence #1 (first plan)  
5 sheets.

Basement and first floor plan.  
Elevations.  
Exterior and interior details.  
Heating and plumbing plans.  
Electrical plans.

Residence #2 (first plan) 6 sheets.

312  
313  
314  
316  
315  
317

Basement and foundation plan.  
First floor plan.  
Elevations.  
Exterior and interior details.  
Heating and plumbing plans.  
Electrical plans.

Residence #1 (second plan) 4 sheets.

470  
471  
472  
473

Basement and first floor plan-Kitchen details.  
Elevations and details.  
Heating and plumbing plans.  
Electrical plans.

Residence #2 (second plan) 3 sheets.

530

Foundation and first floor plan-Electrical  
details.

531  
532

Elevations and sections  
Heating and plumbing-Sections-Details.

21

PAINT AND LUBE OIL STORAGE--1 sheet.

76

Plans-Elevations-Details.

11

RECREATION BUILDING--16 sheets.

320  
322  
323  
324  
325  
326  
327  
328  
377  
378  
379

Foundation plan.  
First floor plan.  
Elevations.  
Elevations and sections.  
Section and elevations.  
Ceiling framing plan.  
Roof framing plan.  
Exterior details.  
Truss details.  
Fixture details.  
Miscellaneous interior and exterior details.

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		RECREATION BUILDING--16 sheets
	454	Plumbing and heating foundation plan.
	455	Plumbing and heating first floor plan.
	484	Electrical plans and details.
	485	Revisions in projection room.
	475	Details basketball court-Cabinets in barber shop.
15		STATION MAINTENANCE AND UTILITY SHOP--3 sheets.
	139	Plans, elevations and details.
	156	Plumbing and heating.
	207	Electrical details.
20		STOREHOUSE--4 sheets.
	38	Plans and details.
	39	Elevations and details.
	75	Plumbing and heating plans.
	95	Electrical wiring and fire alarm system.
2		CLEARING--1 sheet.
	297	Clearing (final map).
		Numerous monthly progress sketch sheets.
24		FIRE ALARM SYSTEM--1 sheet
	229	Fire alarm system, zone map and box locations.
24		POWER DISTRIBUTION SYSTEM--40 sheets.
	247	Proposed pole location north of "C" street.
	250	Distribution system hangar "B" area.
	251	Distribution system B.O.Q. area (preliminary).
	252	Distribution system north end.
	253	Distribution system B.O.Q. area (final).
	254	Two pole transformer structure three 37½ or three 50 KVA platform mounted.
	362	Distribution system hangar "A" area.
	368	Power and communication lines to radio building (N½).
	369	Power and communication lines to radio building (S½).
	439	Street lighting system B.O.Q. area.
	440	Street lighting system hangar "B" area.
	441	Street lighting system hangar "A" area.
	231	Distribution line 3 ¢ tap from a 3 ¢ line.
	232	Distribution line secondary assemblies.
	233	Distribution line dead end tap and assemblies.
	234	Distribution line pole top assemblies 90 angle 3 ¢ line.
	235	Distribution line pole top assembly-tangent.
	236	Distribution line pole top assemblies.
	237	Distribution line guy and anchor assembly.
	238	Distribution line guy assemblies.
	239	Distribution line pole top assembly 1 ¢ 90 Ang
	240	Distribution line pole top assembly 1 ¢ tap fr 3 ¢.

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		POWER DISTRIBUTION SYSTEM--40 sheets.
	241	Distribution line 1 & dead end.
	242	Distribution line 3 & dead end.
	243	Distribution line poles in vicinity Elimp Blvd. & "E".
	244	Distribution line 1 & tap from 3 & line at 90 angle.
	245	Distribution line ground assembly.
	246	Distribution line 3 & angle assembly 30-60.
	248	Distribution line 3 & transformer bank.
	249	Distribution line single & transformer assembl
	255	Distribution line 3 & angle 60-90.
	363	Distribution line 3 wire and 4 wire assemblies
	364	Distribution line 3 & 4 wire 60-90 with 3 wire overbuilt.
	365	Distribution line 90 angle 3 & 4 wire line with 3 & 3 wire overbuilt.
	366	Distribution line assembly for takeoff pole from substation.
	367	Distribution line 1 & angle 60-90.
	370	Distribution line electric light pole.
	371	Distribution line normal position of fire alar assembly and telephone cable on distributio pole.
	503	Distribution line, Transmission line right of way for Mountain States Power Co.
	529	Distribution line 3 & tap from 3 & line at ang
24		WATER SUPPLY--20 sheets.
	19	Two pipe lines, water supply to City of Tilla- mook.
	23	Water distribution system.
	41	Water supply line specials.
	105	Water supply line, landing circle-hangar "A" area.
	159	16 inch water supply line. Construction layou
	162	Water distribution details 12" & 16" takeoff and 12" takeoff to reservoir.
	170	Water distribution lines typical sections.
	211	Water distribution 12" reservoir supply line.
	220	Water distribution system hangar "A" section.
	221	Water distribution system hangar "B" section.
	222	Water distribution system E.O.Q. section.
	223	Water distribution system B.O.Q. to disposal plant.
	224	Water distribution system mooring circles #4,5
	225	Water distribution system mooring circles #1,2
	226	Water distribution system reservoir outlet lin
	228	Water distribution system hydrant numbers.

Budocks Sheet  
project file  
number. number.

		WATER SUPPLY--20 sheets.
	280	Storage reservoir plan and sections.
	281	Storage reservoir construction details.
	282	Storage reservoir staking plan.
1		ACCESS RAILROAD--34 sheets.
	341	Map of right of way.
	523	Right of way monuments.
	428	Grade crossing at county road No. 30B at R.R. sta. 13-32.
	427	Grade crossing at county road No. 413 at R.R. sta. 134-70.
	426	Grade crossing at county road No. 12B at R.R. sta. 107-24.
	451	Alignment and profile.
	452	Alignment and profile.
	453	Alignment and profile.
	519	Standard pile trestle and sidewalk.
	117	Pier details Trask River bridge.
	431	Fencing plan.
	432	Fencing plan details.
	264	Farm overcrossings.
	465	Tile drains and graded underpass.
	438	Tillamook drainage district.
	521	Switch and derail layout.
	520	Switch stands.
	522	Miscellaneous details.
	342	Railroad right of way parcel No. 1.
	343	Railroad right of way parcel No. 3.
	344	Railroad right of way parcel No. 4.
	345	Railroad right of way parcel No. 5.
	346	Railroad right of way parcel No. 6.
	347	Railroad right of way parcel No. 7.
	348	Railroad right of way parcel No. 8.
	349	Railroad right of way parcel No. 9.
	350	Railroad right of way parcel No. 10.
	351	Railroad right of way parcel No. 11A and 11B.
	352	Railroad right of way parcel No. 12.
	353	Railroad right of way parcel No. 13.
	354	Railroad right of way parcel No. 14.
	355	Railroad right of way parcel No. 15.
	356	Railroad right of way parcel No. 16.
	374	Railroad right of way parcel No. 2.
2		OUTFALL DRAINAGE DITCH--3 sheets.
	329	Drainage ditch to Trask River Sta. 0-00 to 14-14
	18	Headwall for culvert under State Highway (US 10
	150	Plan-profile.
2		NORTH DIVERSION DITCH--1 sheet.
	413	Grade and alignment.



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0		PROPERTY OWNERSHIP--1 sheet.
	14	Ownership map.
24		COMMUNICATION SYSTEM--2 sheets.
	491	North end.
	492	Mooring Circles 4,5,6.
	493	Hanger "B" area.
	494	E.O.Q. area.
	495	Hanger "A" area.
	496	Mooring Circles 1,2,3.
	497	Radio transmitter building.
	497	Radio transmitter building, sheet 2.
3		HANGER UTILITIES TUNNEL--2 sheets.
	269	Plan of tunnel.
	183	Utilities (underground).
2		GRADING PLANS--6 sheets.
	195	Vicinity circles 4,5,6.
	404	Finished grades mooring circle.
	430	Hanger "B" apron.
	448	Hanger "B" to NE runway.
	500	Hanger "A" apron and approaches.
	449	Hanger "A" to SE runway.
26		STORM SEWERS--8 sheets.
	209	Storm sewer details.
	213	Storm sewer barracks area.
	219	Storm sewer E.O.Q. area.
	268	Storm sewer landing circle.
	231	Storm sewer operations area.
	294	Storm drain "D" street.
	102	Roadway drainage structures.
	331	Operations area.
3		SOIL BEARING TESTS--3 sheets.
	122	Hanger "A".
	123	Hanger "A" test No. 2.
	128	Hanger "B" SE side.
5		HELIUM STORAGE--3 sheets.
	261	Layout.
	436	Staking plan at hangar "A".
	437	Staking plan Hortonsphere at Hangar "B"
22		GASOLINE SERVICE STATION--3 sheets.
	429	Plan and elevation.
	436	Tank elevation.
	381	Grading and details.
22		GASOLINE STORAGE--4 sheets.
	118	Storage and service details.
	293	Distribution system-Plot plan and details.
	381	Electrical plans.
	396	Power sleeves for storage tank.

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24	42	SANITARY SEWER SYSTEM--12 sheets.
	72	Manholes and appurtenances.
	89	Manholes and appurtenances, sheet 2.
	197	Sewer system.
	198	Trunk sewer.
	199	Trunk sewer sta. 0-00 to 12-00.
	200	Trunk sewer sta. 12-00 to 37-79.
	201	Trunk sewer sta. 37-79 to 59-99.
	202	Administration building sewer.
	203	Barracks sewer.
	204	Hangar road, Blimp Blvd. and Incinerator sewer.
	210	E.O.Q. and storehouse "D" sewer.
4		Garage group sewer.
	138	MOBILE MOORING MASTS--6 sheets.
	147	Mast anchorage facilities.
	161	Grading plan, spoil area east of mooring circle No. 6.
	279	Mooring circles 4,5,6, utilities plan.
	400	Mooring circles 1,2,3, utilities plan.
	466	Layout and grades, landing circle to mooring circles 4,5.
2		Layout and grades, landing circle to mooring circles 1,2.
	508	FINISHED GRADE CONTOURS--5 sheets.
	510	Garage area.
	511	Barracks area.
	509	Dispensary area.
	506	Administration building and E.O.Q. area.
26		Vicinity mooring circles 1,2,3.
	127	ROADS--12 sheets.
	126	Street profiles, hangar and industrial area.
	292	Street plan, hangar and industrial area.
	502	South access road.
	499	Reservoir road.
	97	Fire station (roads and walks).
	96	Blimp Boulevard.
	458	Blimp Boulevard.
	230	Officers residence road.
	215	Radio road.
	486	Administration building and officers quarters.
	536	Plan of standard wooden walk etc.
6		Cemetery road.
	409	WAVES QUARTERS--3 sheets.
	395	Living quarters.
	394	Suters barn development.
24		Suters barn development.
	507	STEAM DISTRIBUTION SYSTEM--4 sheets.
		Plan.

Budocks Sheet  
project file  
number. number

	463	STEAM DISTRIBUTION SYSTEM--4 sheets.
	539	Profile and grades.
	295	Grade Sheets.
25		Typical Boiler settings.
	512	SEWAGE TREATMENT PLANT--4 sheets.
	513	General arrangements and details of sludge bed:
	514	Settling tank and diversion manholes.
	515	Digester and operating house.
	516	Structural details settling tank
16		Structural details digester.
		BOILER PLANT - FUEL STORAGE--4 sheets.
		General layout.
		Conveyor loading pits.
		Conveyor housing.
		Control house and head mast.
		MISCELLANEOUS--4 sheets.
		Air station boundary.
		Bonneville transmission line.
		Plan of testing machine.
		Auxiliary airship site (Astoria Oregon).

As per instructions in the manual for Accounting, Auditing and Control of negotiated contracts, the following folios of plans for each unit of the project were prepared and transmitted to the Officer-in-Charge upon completion of the work.

#### BUILDINGS

Administration  
Ammunition Storage  
Barracks  
B.O.Q. Junior  
B.O.Q. Senior  
Brig  
Cold Storage  
Dispensary  
Fire Station  
Dope Storage  
Garage  
Gate House  
Laundry  
Mess Hall - Men's  
Mess Hall - Officer's  
Paint & Lube Oil Storage  
Recreation  
Station Maintenance & Utility  
Steam Power Plant  
Storehouse

#### UTILITIES etc.

Access Railroad  
Air Station Boundary  
Communication System  
Ditches - Outfall to Tillamook River North diversion  
Electrical Distribution System  
Fire Alarm System  
Fuel Storage  
Gasoline Storage  
Grading  
Hanger Utilities Tunnel  
Mooring Circles  
Property Ownerships  
Roads  
Service Station  
Sewer - Sanitary  
Sewer - Storm  
Sewage Treatment Plant  
Steam Distribution  
Water Supply

Two sets of specifications were also delivered.

## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### A. Administrative Data

See Table of Administrative Data, Part "B".  
The information contained in Part "B" was obtained from the following source:

1. Records available in the Public Works Office at site of project.
2. Contractor's files located in the Spalding Bldg., Portland, Oregon.

OUTLINE OF NARRATION

IV. ADMINISTRATIVE DISCUSSION

B. Type of Contract

Cost-Plus-A-Fixed-Fee Contract for Architectural-Engineering Service.

OUTLINE OF NARRATION

IV. ADMINISTRATIVE DISCUSSION

C. Costs, Discussion of

1. A & E Profit Net

<u>Construction Work for Which A &amp; E Services were Performed</u>	<u>Fee</u>	<u>Percenta</u>
\$3,686,000	\$27,000	0.73

The percentage of fee based on the construction cost does not seem excessive taking all factors into consideration.

OUTLINE OF NARRATION

IV. ADMINISTRATIVE DISCUSSION

C. Costs, Discussion of

2. Design Costs

<u>Net A &amp; E Cost</u>	<u>Fee</u>	<u>Total Design Cost</u>
\$118,325.65	\$27,000	\$145,325.65

Percentage of Design Cost of Construction Cost  
3.94%.

The percentage of design cost of Construction  
Cost was not excessive for this type of contract.



## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### D. Overtime

##### 1. Speed-up Program

The Architect-Engineer employed an 8-hour day 6 days a week. As a general rule, overtime was confined to Key personnel whose rate of pay was unrelated to hours worked.

OUTLINE OF NARRATION

IV. ADMINISTRATIVE DISCUSSION

D. Overtime

2. Necessary to Hold Personnel

Payment of overtime as an inducement to remain on the job was not encountered.

OUTLINE OF NARRATION

IV. ADMINISTRATIVE DISCUSSION

E. Relations with the A & E

The relations with the Architect-Engineer were excellent.

## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### F. Close Out Procedure

The close out forms were prepared in the home office of the Architect-Engineer and submitted to the Navy office on the site for perusal and checking.

All existing Bureau directives were followed in the preparation of the CPFF Close Out of this contract.

# COMPENSED PROGRESS GRAPH

PROJECT OR BUILDING	JULY AUG SEPT OCT NOV DEC JAN FEB MAR												REMARKS
	10	20	10	20	10	20	10	20	10	20	10	20	
12-Administration Bldg.													Several basic changes after final completion. Metrological room enlarged. Plans revised for size and design. Hog-fuel heating system required some change in design.  This was done as a fillin job when crews were not needed on other work.
27-Ammunition storage 6 -barracks (3)													
19-Boundary fence 0 -boundary surveys													
9 -Bachelor officers 49-Brig													
16-Central heating													
2 -Clearing													Determination of equipment available caused delays. Progress surveys followed clearing operations.  Plans revised several times to meet Medical Officers suggestions.  Some revisions necessary because of changes in general operations plan. Speed depended upon final building locations  Special design, enlarged quarters garage eliminated. Included investigations of existing plants of like capacity. Delays pending decision as to location, equipment etc.
7A-Cold storage 14-Dispensary													
28-Dope storage bldg. 2 -Drainage													
24-Electrical dist.													
24-Fire Alarm system 17-Fire Station													
16-Fuel storage													Special plans for utilities tunnel. Also used on other hangar.
22-Gasoline storage													
19-Cante House 3 -Hangar No. 1													
3 -Hangar No. 2													




CONDENSED PROGRESS GRAPH

PROJECT OR BUILDING	JULY		AUG		SEPT		OCT		NOV		DEC		JAN		FEB		MAR		REMARKS
	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20	
26-Station maint.																			Final plan delayed pending loca- tion of laundry and laundry steam requirements known.  Design well in advance of construction.  Delays pending building locations and capacity requirements.
24-Steam Distribution																			
20-Storehouses (2)																			
26-Storm sewers																			
24-Telephone system																			
24-Water distribution																			

NOTE:- This graph indicates the total elapsed time from beginning of surveys to completion of plans for each project or building. It does not necessarily indicate the actual time consumed on each unit. Delays were caused for various reasons, see remarks column.

This report is approved by the Officer-in-  
Charge of Construction.

  
C. E. Harvey  
Lieut. (jg) CEC USNR  
Officer-in-Charge of Constr.



EXPLORATION REPORT

NO. 5614

NAVY AIR STATION

WILLAMETTE OREGON

RELEASE UNDER CONTRACT NOy- 5614

Pursuant to provisions of Contract NOy- 5614, dated 12 June 1942  
 by and between the United States (the Government) and JOHN W. CHRISTOPHER & ASSOCIATES  
 (the contractor) for Architectural-engineering service for U.S. Naval Air  
Station (ISA) at Tillamook, Oregon

and in consideration of the payment by the Government of the total sum of One Hundred forty-fi  
seven cents  
Thousand, three hundred twenty one dollars and thirty- dollars (\$145,321.37),

the receipt of which is acknowledged, the contractor does hereby release the Government from all claims arising under or by virtue of said contract.

**Exception is taken as follows:****Schedule XIII - Statement of Disallowances**

Contractor Owed Rentals - - - - - \$ 137.00

Penalty on Excise Tax - - - - - 14.13

\$ 201.53

All claims for reimbursement of moneys the Contractor may hereafter be legally required to pay on account of claims or demands, of whatever nature arising under or in connection with said Contract, NOy-5614, and now undisclosed and unknown to the Contractor

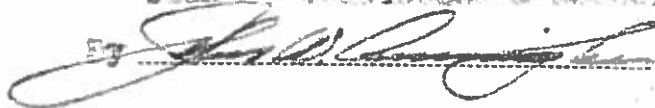
Executed at Portland, this 2nd  
 day of February, 1944

In the presence of:

/s/ Agnes A. Deeth

/s/ Edward J. Jaros

JOHN W. CHRISTOPHER &amp; ASSOCIATES


 [SEAL]

CONTRACT NO. NOy-5614 FOR ARCHITECT-ENGINEER SERVICE.

FACTS RELATED TO CLAIM FOR ADDITIONAL FEE.

1. Work under Contract NOy5614 was initiated upon receipt ( on June 20, 1942 ) of the Letter of Intent, dated June 12, 1942. The contract was not received until August 15, 1942. Neither the Officer in Charge or the Architect-Engineer had ever seen a similar contract and they were unfamiliar with the terms and scope thereof.

2. In the absence of definite instructions, and with the approval of the Officer in Charge, the Architect-Engineers undertook to perform the work usually done by engineers on engineering projects. They organized a large force, including field engineers and surveyors, and made preliminary surveys including profiles and topography, and after designs were completed, staked out the work for construction, took cross-sections and computed quantities for payment of sub-contractors. Later when the contract was received, it became apparent that all of these services were not required of the Architect-Engineers, and field forces and work related to construction was transferred to the Construction contractor under Contract NOy-5424. However, for the sake of proper coordination, all preliminary field engineering for the entire project was done by the Architect-Engineers.

3. A list of sub-projects, received on or about the same time as the Letter of Intent, and later embodied in the contract, classifies the work to be done as follows:

- (a) Sub-projects upon which "complete desing work to be accomplished by the Architect-Engineer.  
Est.cost \$ 2,288,00
- (b) Standard plans furnished "requiring only design of foundations and fireproofing of roofs".  
Est.cost 1,184,00
- (c) Designed by Bureau and "require no engineering services".  
Est.cost 1,741,00

4. Some of the "standard plans" were not furnished, or arrived after the work was under way. In some cases the buildings were not of the proper size for this station, or required extensive changes to meet local conditions and materials. To permit the work to go ahead without delay, the Architect-Engineers prepared complete working plans and specifications for most of the buildings classified in the contract under Group (b) above.

5. While the work was under way, the project was expanded by the addition of a second hangar, with added buildings and

increased facilities. The Architect-Engineers made changes in plans and additional plans, as required. In connection with the added work, the construction contractor (Contract NOy-5614) received change orders and increased fixed fees. To avoid delay, the Architect-Engineers went ahead without advance authority from the Bureau, but with the approval of the Officer in Charge.

6. As a result of the additions to Station facilities, and the necessity of preparing detailed plans and specifications, the scope of the work and its estimated cost under the groupings used in Paragraph 3 above has been changed to the following:

- (a) Complete design work      Est. cost      \$ 4,041,400.
- (b) Limited services only      Est. cost      162,000.
- (c) In connection with the hangars, supervision of foundation tests, design of utility tunnel, and other minor services were rendered.

7. Handling of field engineering, as described in Paragraph 2 above, added substantially to the responsibility and costs of the Architect-Engineers.

8. The work of the Architect-Engineer was conducted with economy and efficiency. In spite of the great increase in scope of the projects, the costs have been kept well within the original allotment of \$ 150,000. Though the only duplication of construction from the same plans was for the barracks buildings, the total engineering and architectural cost is only 3.4% of the estimated construction cost. When actual construction costs are known, the percentage will be even lower.

9. The architect-Engineers are not claiming any specific amount as an addition to the fixed fee. If the increased scope of the work can be established and agreed upon, they are willing to have the fixed fee computed by the regular formula adopted and used by the Bureau in similar cases.

Submitted July 10, 1943

JOHN W. CUNNINGHAM & ASSOCIATES

By

AGREEMENT REGARDING PREMIUM PAYMENTS  
(Assignment, Assumption of Premium Obligations)

It is agreed that return premiums and premium refunds due or to become due the insured under policies No. SLA 1136 are hereby assigned to and shall be paid to the United States of America and the insured directs the Company to make such payments to the Treasurer of the United States acting for and on account of the United States of America.

The United States of America hereby assumes and agrees to fulfill all present and future obligations of the insured with respect to the payment of premiums under said policies.

This endorsement, upon acceptance by the insured, the United States of America and the Company shall be effective from  
FEBRUARY 2, 1944

Accepted Feb. 2, 1944  
(date)

PHOENIX INDEMNITY COMPANY

Insurer  
PHIL GROSSMAYER CO. GENERAL AG  
By R. B. Oeschman

Accepted 2 February 1944  
(date)

United States of America

By  
Lieutenant, CEC-V(S) USNR

Accepted Feb 3, 1944  
(date)

John W. Cunningham & Assoc.  
Insured  
By John W. Cunningham

AGREEMENT REGARDING PREMIUM PAYMENTS  
(Assignment, Assumption of Premium Obligations)

It is agreed that return premiums and premium refunds due or to become due the insured under policies No. M 59609 are hereby assigned to and shall be paid to the United States of America and the insured directs the Company to make such payments to the Treasurer of the United States acting for and on account of the United States of America.

The United States of America hereby assumes and agrees to fulfill all present and future obligations of the insured with respect to the payment of premiums under said policies.

This endorsement, upon acceptance by the insured, the United States of America and the Company shall be effective from

FEBRUARY 2, 1944

Accepted FEBRUARY 2, 1944  
(date)

THE TRAVELERS FIRE INS. CO.

Insurer  
PHIL GROSSMAYE CO., GENERAL AGENTS

By R B O'Connell

Accepted 2 February 1944  
(date)

United States of America

By  
Lieutenant, CEC-V(S) USNR

Accepted Feb. 2, 1944  
(date)

Wm W. Cunningham & Associates  
Insured

By John W. Cunningham

(Para. B) ASSIGNMENT OF CREDITS AND RIGHTS.

KNOW ALL MEN BY THESE PRESENTS:

THAT John W. Cunningham & Associates

1. A corporation organized and existing under the laws of the state of \_\_\_\_\_
2. A partnership consisting of \_\_\_\_\_ 3 partners
3. An individual trading as \_\_\_\_\_

in consideration of the reimbursement for all costs incurred and paid and the payment of the fee provided for under the terms of Contract Buy 5614 does hereby transfer, assign, and set over to the United States of America, hereinafter called the Government, represented by the Chief of the Bureau of Yards and Docks, Navy Department, all right, title, and interest arising under the said contract together with all the rights of action accrued or which may hereinafter accrue thereunder and does hereby constitute and appoint the Chief of the Bureau of Yards and Docks or his authorized representative (or his duly constituted successor in office) to be its attorney irrevocable in the premises, to do and perform all acts, matters, and things in like manner to all intents and purposes as if it had acted in the premises.

IN WITNESS WHEREOF, said company has caused these presents to be signed in its name, by its partners, this 10th day of July, 1943.

JOHN W. CUNNINGHAM  
AND ASSOCIATES

\_\_\_\_\_  
COMPANY

John W. Cunningham  
\_\_\_\_\_  
TITLE

\_\_\_\_\_  
COMPANY

\_\_\_\_\_  
TITLE

\_\_\_\_\_  
COMPANY

\_\_\_\_\_  
TITLE



PUBLIC VOUCHER FOR PURCHASES AND SERVICES OTHER THAN PERSONAL

D. O. Vou. No. 30-Pre-Final  
Bu. Vou. No.

GENERAL ACCOUNTING  
OFFICE PREAUDIT

Certified for payment in the  
sum of \$

Comptroller General of the  
United States

By

U. S. NAVY DEPARTMENT BUREAU OF YARDS & DOCKS

(Department, bureau, or establishment)

Voucher prepared at U. S. Naval Air Station, Tillamook,

(Give place and date) Oregon

THE UNITED STATES, Dr.,

31 December 1943

To John W. Cunningham & Associates

(Payee)

Address 1112 Spalding Bldg., Portland, Oregon

Payee's Account No.

PAID BY

(For use of Paying Office)

No. and Date of Order	Date of Delivery or Service	Articles or Services (Enter description, item number of contract or general supply schedule, and other information deemed necessary) Terms % Discount Cash days	Quantity	UNIT PRICE		AMOUNT	
				Cost	Per	Dollars	Cts.
		Brought forward from continuation sheet(s)					
51	December 1943	TO REIMBURSABLE EXPENDITURES under the CPFF Contract indicated below, as determined by the Officer-in-Charge of Construction and not heretofore included in any public voucher . . . . .					
		TO FIXED FEE . . . . .				7000.	00
						7000.	00

Shipped from to Weight Government B/L No. Total 7000.00

(Payee must NOT use this space)

Differences

\*Payee John W. Cunningham & Associates

(This certificate is required when a bill is made by payee on attachment or bill)

(Sign original only)

Per John W. Cunningham Title Partner

Account verified; correct for

(Signature or initials)

Contract No. 100-5614

Date July 1942 Req. No.

Date

Invoice Rec'd

7000.00

MEMORANDUM

C. B. Harvey, Lieut. (jg), GEO USNR  
Officer-in-Charge of Constr.

ACCOUNTING CLASSIFICATION (for completion by Administrative Office)

100-5614

Appropriation, limitation, or project symbol	Appropriation title		Limit'n or Profit Amount	Appropriation Amount	
17X1204(7)	Public Works, Bureau of Yards & Docks			\$150,000.	
Allotment symbol	Amount	Obligations liquidated	COST ACCOUNT		OBJECTIVE CLASSIFICATION
			Symbol	Amount	Symbol Amount

Paid by { Check No. dated 19 for \$ { on Treasurer of the United States in favor of  
Cash, \$ on 19 Payee { payee named above.

(Sign original only)

\* When a voucher is signed or receipted in the name of a company or corporation, the name of the person writing the voucher or corporate name, or will as the company in which he signs, must appear. For example: "John Doe Company, per John Smith, Secretary" or "Treasurer", as the case may be. If the ability to certify and authority to approve are combined in one person, one signature only is necessary; otherwise the approving officer will sign in the blank space below "Approved for \$" and over his official title.

Per

Title



# METHOD OF OR ABSENCE OF ADVERTISING

(Section 3709 of the Revised Statutes)

1. After advertising in newspapers.

2. (a) After advertising by circular letters sent to \_\_\_\_\_ dealers.

(b) And by notices posted in public places.

(If notices were not posted in addition to advertising by circular letters sent to dealers, explanation of such omission must be made. The notation on the certificate on the face of the voucher must be "2(a)(b)" or "2(a)", depending on whether or not notices were posted.)

3. Without advertising, under an exigency of the service which existed prior to the order and would not admit of the delay incident to advertising.

4. Without advertising in accordance with \_\_\_\_\_

5. Without advertising, it being impracticable to secure competition because of \_\_\_\_\_

(Here state in detail the nature of the exigency or circumstances under which the securing of competition was impracticable under 3 and 4)

NOTE.—The above form "Method of or Absence of Advertising" is to be used when purchases are made or services secured under proper authority without written agreement in any form. In case of a written agreement (formal contract, proposal, and acceptance, or less formal agreement) Standard Form No. 1036—Revised should be used for abstracting the method of or absence of advertising and award of contract. (See General Regulations No. 51, Supplement No. 6, General Accounting Office, Aug. 20, 1930.)

I certify that the above bill is correct and just; that payment therefor has not been received; that all statutory requirements as to American production and labor standards, and all conditions of purchase applicable to the transactions have been complied with; and that State or local sales taxes are not included in the amounts billed.

Payee \_\_\_\_\_

Date \_\_\_\_\_

Per \_\_\_\_\_ Title \_\_\_\_\_

## Distribution to Appropriations

APPROPRIATION AND SUBHEAD	AMOUNT	APPROPRIATION AND SUBHEAD	AMOUNT
	\$ _____		\$ _____
		17X1204(7)	7,000.00
		TOTAL,	\$ 7,000.00

Total Probable Cost  
Less Fee

Fee

Percent

Vouchers approved to date including this voucher \$18,321.37 \$26,900.00 \*

Estimate to Complete, and unpaid balance of Fee \*\*\$ 4,678.63 \$ 100.00 \*

\*\*Estimated.

U. S. GOVERNMENT PRINTING OFFICE 16-53948-1

Not applicable to this contract.

PUBLIC VOUCHER FOR PURCHASES AND SERVICES OTHER THAN PERSONAL

D. O. Vou. No. \_\_\_\_\_  
Bu. Vou. No. 31 - Final

GENERAL ACCOUNTING  
OFFICE PREAUDIT

Certified for payment in the  
sum of \$ \_\_\_\_\_

Comptroller General of the  
United States

By \_\_\_\_\_

U. S. NAVY DEPARTMENT, BUREAU OF YARDS & DOCKS  
(Department, bureau, or establishment)

Voucher prepared at U. S. Naval Air Station, Tillamook,  
(Give place and date) Oregon

THE UNITED STATES, Dr., 31 December 1943

To John W. Cunningham & Associates  
(Payee)

Address 1112 Spalding Bldg., Portland, Oregon

Payee's Account No. \_\_\_\_\_

PAID BY

(For use of Paying Office)

No. and Date of Order	Date of Delivery or Service	Articles or Services (Enter description, item number of contract or general supply schedule, and other information deemed necessary) Terms _____ % Discount Cash _____ days	Quantity	UNIT PRICE		AMOUNT	
				Cost	Per	Dollars	Cts.
		Brought forward from continuation sheet(s)					
31	December 1943	TO REIMBURSABLE EXPENDITURES under the CPFF Contract indicated below, as determined by the Officer-in-Charge of Construction and not heretofore included in any public voucher . . . . .					
		TO FIXED FEE . . . . .				100.00	

Shipped from \_\_\_\_\_ to \_\_\_\_\_ Weight \_\_\_\_\_ Government B/L No. \_\_\_\_\_ Total 100.00

(Payee must NOT use this space)

Differences \_\_\_\_\_

\*Payee John W. Cunningham & Associates (Sign original only)  
(This space is reserved for a separate bill or bill of exchange)

Account verified; correct for \_\_\_\_\_

(Signature or initials) \_\_\_\_\_

John W. Cunningham Partner

Contract No. NOY-5614 Date July 1942 Reg. No. \_\_\_\_\_ Date \_\_\_\_\_ Invoice Rec'd \_\_\_\_\_

MEMORANDUM

100.00

C. B. Harvey, Lieut. (jg), CEC USNR  
Officer-in-Charge of Constr.

ACCOUNTING CLASSIFICATION (for completion by Administrative Office) / NOY-5614

Appropriation, limitation, or project symbol	Appropriation title				Limit'n or Proj't Amount	Appropriation Amount
17X1204(7)	Public Works, Bureau of Yards & Docks					\$150,000.
Allotment symbol	Amount	Obligations liquidated	COST ACCOUNT		OBJECTIVE CLASSIFICATION	
			Symbol	Amount	Symbol	Amount

paid by { Check No. \_\_\_\_\_ dated \_\_\_\_\_ 19\_\_\_\_ for \$ \_\_\_\_\_ } on Treasurer of the United States in favor of  
{ Cash, \$ \_\_\_\_\_, on \_\_\_\_\_ 19\_\_\_\_ Payee \_\_\_\_\_ } payee named above.

(Sign original only)

\* When a voucher is signed or receipted in the name of a company or corporation, the name of the person writing the company or corporate name, as well as the capacity in which he signs, must appear. For example: John Doe Company, per John Smith, Secretary, or Treasurer, as the case may be. If the ability to certify and authority to approve are combined in one person, one signature only is necessary; otherwise the approving officer will sign in the blank space below "Approved for \_\_\_\_\_", and over his official title.

Per \_\_\_\_\_ Title \_\_\_\_\_

(Section 3700 of the Revised Statutes)

- (If notices were not posted in addition to advertising by circular letters sent to dealers, explanation of such omission must be made. The notation on the certificate on the face of the voucher must be "2(a)(b)" or "2(a)", depending on whether or not notices were posted.)

4. Without advertising in accordance with

- (Here state in detail the nature of the exigency or circumstances under which the securing of competition was impracticable under 8 and 4)

I certify that the above bill is correct and just; that payment therefor has not been received; that all statutory requirements as to American production and labor standards, and all conditions of purchase applicable to the transactions have been complied with; and that State or local sales taxes are not included in the amounts billed.

Date \_\_\_\_\_

Per

Title

APPROPRIATION AND SUBHEAD	AMOUNT	APPROPRIATION AND SUBHEAD	AMOUNT
	\$		\$
		17X1204(7)	100.00
			100.00
		TOTAL,	\$

118,321.37 <sup>Less Fee</sup>

Feo

Percent

5

2

\*\*\*

\*\*Estimated.

U. S. GOVERNMENT PRINTING OFFICE 16-33948-1

\*Not applicable to this contract.

(Para. D)  
Contract NOY 5614

# FINAL STATEMENT OF CONTRACT COSTS

Date August 6 1943

		Book Construction Costs	Appropriation Construction Costs
<b>EXPENDITURES - Contractor</b>			
Public Vouchers			
Labor	\$101,476.63		
Material & Supplies	6,101.77		
Construction Plant Purchases	3,331.46		
Equip. Rentals-Contractor-Owned	47.20		
Third Party	1,202.99		
Subcontracts	- 0 -		
Other Items	7,116.93		
Contractor's Fee	27,000.00	\$145,325.37	\$145,325.37
<b>EXPENDITURES-Navy (Schedule VI) (add)</b>			
With Appropriation Charges			
Yard Labor-Mat. & Supplies	- 0 -		
-Labor	- 0 -		
-Equip. Service	- 0 -		
Freight	4.28		
Other Items	- 0 -	4.28	4.28
Sub Total		145,325.65	145,325.65
<b>OBLIGATIONS-Contingent (add)</b>			
Outstanding Obligations-Contractor's			
Unclaimed Wages - (Schedule I)	- 0 -		
Outstanding Taxes - (Schedule II)	- 0 -		
Outstanding Claims - (Schedule III)	- 0 -		
Other Obligations - (Schedule IV)	- 0 -	- 0 -	- 0 -
<b>OUTSTANDING Obligations-Navy</b>			
Miscellaneous (Schedule VII)	- 0 -	- 0 -	- 0 -
<b>NAVY CONTRIBUTIONS - (Schedule VI) (add)</b>			
Without Appropriation Charges			
Mat. & Supplies on Memo. Inv.	- 0 -		
Equipment in APA	- 0 -		
Equipment Service	- 0 -	- 0 -	- 0 -
TOTAL-GROSS CONSTRUCTION COSTS		145,325.65	145,325.65
<b>CREDITS &amp; REFUNDS DUE-(Schedule V) (sub-tract)</b>			
Insurance Refunds	- 0 -		
Miscellaneous	- 0 -	- 0 -	- 0 -
TOTAL-NET CONTRACT COSTS		145,325.65	145,325.65
<b>TRANSFERS TO OTHERS (sub-tract)</b>			
Without Funds or Appro. Credit			
Mat. & Supplies on Memo. Inv.	- 0 -		
Equipment in APA	1,627.90	1,627.90	- 0 -
<b>INVENTORIES ON HAND (Schedule VIII)(subtract)</b>			
Plant & Equip. (Non-Expend.)	- 0 -		
Small Tools (Expendable)	- 0 -		
Material & Supplies	- 0 -		
TOTAL - NET CONSTRUCTION COSTS		145,697.75	145,325.65

## (Para. D) FINAL STATEMENT OF UNCLAIMED WAGES

Date Feb. 20, 1943Contract NOy 5614Sheet 1 of 1

Badge No.	Name	PAYROLL Reference				Net Amount of Pay
		No.	Page	Line	Date	
	NONE					

I certify that the above is a complete list of all unclaimed wages in connection with Contract NOy- 5614 the amount of which is included on the Final Statement of Contract Cost under outstanding obligations.

*Hermion Risher*

Contract Accountant

*John W. Cunningham*

Contractor

JOHN W. CUNNINGHAM & ASSOCIATES

## UNCLAIMED BALANCES IN WAR BOND ACCOUNT

Date Feb. 20, 1945Sheet 1 of 1Contract NOy 5614

Badge No.	Name	Address	Balance
	NONE		

I certify that the above is a complete list of all unclaimed balances in connection with Contract NOy-5614 the amount of which is included on the Final Statement of Contract Cost under outstanding obligations.

Hermion Rucher  
Contract Accountant

John W. Cunningham & Associates  
Contractor

JOHN W. CUNNINGHAM &amp; ASSOCIATES

## (Para. D) FINAL STATEMENT OF UNCLAIMED WAR BONDS

Date March 8, 1943Contract No. 5614Sheet 1 of 1

Badge No.	Name	PAYROLL Reference				Net Amount of Pay
		No.	Pago	Line	Date	
	NONE					

I certify that the above is a complete list of all unclaimed wages in connection with Contract No. 5614, the amount of which is included on the Final Statement of Contract Cost under outstanding obligations.

*Hermion Risher*  
Contract Accountant

John W. Cunningham & Associates  
*[Signature]*  
Contractor

## Schedule II

## (Para. 3) Statement of Outstanding Taxes

Contract No. 8614Date March 10, 1943

Payroll No.	Period Ended	Gross Payroll	Less Amount Not Taxable	Net Amount Taxable
				<u>NO NE</u>

## ACQUIRED FROM:

Employee's Deductions,	% for P.O.A.B.	\$ <u>-0-</u>
" "	% for State W. I.	<u>-0-</u>
" "	Victory Tax	<u>-0-</u>
Employers' Contributions,	% for P.O.A.B.	<u>-0-</u>
" "	% for State W. I.	<u>-0-</u>
		\$ <u>-0-</u>
TOTAL, Payable <u>-0-</u>		1943



OUTSTANDING CLAIMS

SCHEDULE III

Contract MOy 5614

Date Mar. 12, 1945

Sheet 1 of 1

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NONE

OTHER OBSERVATIONS

SCHEDULE IV

Contract No 6814

Date Mar. 12, 1943

Sheet 1 of 1

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NONE

STATEMENT OF  
CREDITS AND REFUNDS

SCHEDULE V

Contract NOy 5614

Date March 12, 1943  
Sheet 1 of 1

---

NONE

## NAVY CONTRIBUTIONS

## SCHEDULE VI

Contract No. 5614Date Mar. 12, 1943  
Sheet 1 of 1

## Freight:

\*GB/L No. 434876

\$4.25

\*Form FC 415a covering subject GB/L submitted to Bureau  
w/P.P. Voucher No. 29.

This expenditure applicable to Project No. 3 - Ranger No. 1.

## STATEMENT OF

## SCHEDULE VII

(Para. D) OUTSTANDING OBLIGATIONS TO BE PAID BY NAVY

Contract No. 5414Date March 12, 1943Sheet 1 of 1

Date of Issue	P.O. Number	Description of G B of L No.	Estimated Amount	Appropriation Ultimately Chargeable
NONE				

SCHEDULE VIII

FINAL INVENTORY  
OF  
(Para.D) EQUIPMENT, MATERIALS, & SUPPLIES

Date Aug. 1, 1943

Sheet 1 of 1

Contract NOy 5614

Item	Quantity	Original Cost	New or Used	Estimated Transfer or Salvage Value
	<u>NONE</u>			

DISPOSAL OF GOVERNMENT-OWNED  
EQUIPMENT AND FURNITURE

Contract NOy-5614

Date Aug. 6, 1943  
Sheet 1 of 6

Transferred without funds to the U. S. Naval Air Station, Tillamook, Oregon as requested on the attached copy of Form ES No. 2094.

<u>Equip. No.</u>	<u>Description</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>	<u>Salvage Value</u>
<u>T-10</u>					
50	Green Chevrolet Sedan, 1942 BA283301, #6381215113	1	\$ 1135.00	\$ 1135.00	\$ 828.55
54	Blue Chevrolet Sedan, 1942 BA326478, #6881217139	1	1095.00	1095.00	799.35
Sold to Contract NOy-5424 at a total salvage value of \$4,277.51.					
51	Gray Ford Sedan, Motor No. 18-6875378	1	1060.13	1060.13	769.48
53	Blue Ford Sedan, Motor No. 18-6778062	1	1091.43	1091.43	803.29
<u>G27-A</u>					
4005	Oak Swivel Armless Chair, #6702-0	1	22.50	22.50	18.75
4006	Berloy 5-Dr. Steel Letter File, #1501	1	71.00	71.00	59.18
4010) 4011) 4012)	Northwest Typewriter Chairs	3	16.65	49.95	39.96
4014	#40NC 2-Dr. Letter File, Legal Size, Steel	1	23.40	23.40	20.80
4015	WG-41 Letter File, 4-Dr., Wood	1	47.00	47.00	41.78

<u>Equip. No.</u>	<u>Description</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>	<u>Salvage Value</u>
4022) 4024)	#3095 Paires Fluorescent desk Lamps with 2-15W Tubes	2	\$ 13.41	\$ 26.82	\$ 21.46
4023	#3095 Paires Fluorescent desk Lamp with 2-15W Tubes	1	13.40	13.40	10.72
4025) 4026)	#3095 Paires Fluorescent desk Lamps with 2-15W Tubes	2	13.30	26.60	21.28
4053	Globe Punch with 3 Heads - #8	1	14.22	14.22	11.38
4054	Featherweight Register, Serial #126391	1	7.25	7.25	5.20
4059	Numbering Machine, Force #200, 6-Wheel Model.	1	9.90	9.90	7.92
<u>G27-B</u>					
4008	#601 Howe Scale, Serial #1423392	1	17.48	17.48	14.98
4009	4000 Style Torsion Balance Scale with set of Weights	1	56.85	56.85	48.32
4060) 4061)	2-Burner Electric Hot-plate, #136D71	2	9.50	19.00	15.20
4062) 4063) 4064) 4065) 4066) 4067) 4068)	100' Dreadnaught Chains	7	9.10	63.70	50.96



<u>Equip. No.</u>	<u>Description</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>	<u>Salvage Value</u>
4069) 4070) 4071) 4072) 4073) 4074) 4075)	100' Dreadnaught Chains	7	\$ 9.10	\$ 63.70	\$ 63.70
4076) 4077) 4078) 4079) 4080)	200' Dreadnaught Chains	5	16.80	84.00	67.20
4081) 4082) 4083) 4084) 4085) 4086) 4087)	Leveling Rods, 13', #6210R	7	18.50	129.50	103.60
4088) 4089) 4090)	Leveling Rods, 12', #6220	3	18.50	55.50	44.40
4091	Tyler Testing Sieves consisting of the following: 1-2½" 1-2" 1-1½" 1-1"	1 Set	68.46	68.46	37.38

<u>Equip. No.</u>	<u>Description</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>	<u>Salvage Value</u>
	1-3/4" 1-U.S. 100				
	1-1/2" 1-U.S. 200				
	1-3/8" 1-8" Brass flat cover				
	1-U.S. 4 1-8" Brass bottom pan				
	1-U.S. 10 1 Wire Brush				
	<u>027-C</u>				
4001	Monroe Calculator, MAG-213D 256072	1	\$ 318.75	\$ 318.75	\$ 225.00
4016	Marchant Calculator ACT-10M, #169052-42-50225	1	637.50	637.50	587.37
4021	Ozalid White Print Machine, Model F, No. 10564 220V AC 60 Cycle, Burner #312	1	875.00	875.00	750.00
4002	K&E Planimeter, #4211, Serial #5031	1	25.75	25.75	20.60
4003	K&E Planimeter, F4236, Serial #59620	1	25.00	25.00	21.43
4004	Alteneder Beam Compass in Leather Case	1	25.00	25.00	20.00
4007	Post Highway Curves, #1905	1 Set	32.50	32.50	26.00
4017)					
4018)	#440 Miller Fixtures with 2-40-Watt				
4019)	Tubes (Fluorescent)	5	13.30	66.50	53.20
4027)					
4036)					

<u>Equip. No.</u>	<u>Description</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>	<u>Salvage Value</u>
4028) 4029) 4030) 4031) 4032) 4033) 4034) 4035) 4037) 4038) 4039) 4040) 4041)	#440 Miller Fixtures with 2 - 40-Watt Tubes (Fluorescent)	13	\$ 13.31	\$ 173.03	\$ 138.45
4046	#1624P 24" Paragon Architect Scale	1	10.50	10.50	8.40
4047	#1633P 24" Paragon Triangular Engineers Scale	1	10.50	10.50	8.40
4048	#1633P 24" Paragon Engineers Scale	1	10.50	10.50	8.40
4049	#1333C 24" Triangular Scale	1	10.50	10.50	8.40
405C	Scotch paper edging Machine	1	9.75	9.75	7.80
4051	Bruning Erasing Machine	1	7.50	7.50	6.00
4052	Leroy Lettering Set	1	53.00	53.00	42.40
4055	36" Stainless Steel Straightedge	1	10.90	10.90	8.72
4056	36" Stainless Steel Straightedge	1	10.90	10.90	8.72
4057	48" Stainless Steel Straightedge	1	16.25	16.25	13.00

<u>Equip. No.</u>	<u>Description</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>	<u>Salvage Value</u>
4058	15" Photo Trimmer	1	\$ 9.45	\$ 9.45	\$ 7.56
4042)	#2005 Mitchell Showcase Units with 1-30-Watt Tube	4	9.60	38.40	30.72
4043)					
4044)					
4045)					

C  
O  
P  
Y

CONSTRUCTION EQUIPMENT ORDER

To OinCC Contract NOy-5424

2 April 1943

Naval Air Station, Tillamook, Oregon

ES No. 2094

Reported available by Form FC 520

Requested by BuAer 3rd End. dated 26 Mar to CO ltr dated 2 Feb 43

<u>Item No.</u>	<u>Quantity</u>	<u>Description</u>
1	1	Passenger Car, Ford, Equipment No. E-49 USN 60019
2	1	" " Chevrolet, " No. E-50 USN 60192
3	1	" " " " No. E-54 USN 60198
4	1	" " Ford " No. E-63 USN 60198

Navy Owned

For Station Use

Items Nos. 2 and 3 above are to be transferred to  
Station from Contract NOy 5614

Repair Work As requested by consignee

Packing As requested by consignee

Case Marks ES 2094

Ship To Commanding Officer, Naval Air Station, Tillamook, Oregon

Date Immediately

Payment Commanding Officer, N.A.S. Tillamook, Oregon

Without transfer of funds

Replacement Equipment None required

CC: C1

Cll. 2 copies Commanding Officer, NAS, Tillamook, Oregon

AE Depot. 2 copies

Bureau Files

P. T. Williams  
By direction of Chief of Bureau

John W. Cunningham & Associates  
 Tillamook, Oregon  
 Contract NOY-5614

STATEMENT RECONCILING RENTALS REPORTED UNDER FC 1019  
 TO CORRESPONDING ITEM SHOWN ON FINAL STATEMENT OF  
 CONTRACT COST

Job Equip. No.	Description	Appraised Value When Received	Monthly or other Rental Rate	Dates Covering Rental Period Start End	Cumulative Rentals Paid to Date	Rentals Accrued but not Paid
<u>Rentals as Actually Paid</u>						
E-3019	#13609 K & E Level	200.00	15.00	8/15/42 3/1/43	98.00	
E-3020	#1828410 KHM 26 Elite Typewriter)	151.75	3 mo. 32.50	8/ 5/42 3/5/43	75.33	
E-3021	#2208669 KHM 11 Elite Typewriter)	425.00	20.00	10/ 1/42 3/1/43	100.00	
E-3022	#370 Leupold & Volpel Transit	295.00	20.00	10/12/42 3/1/43	92.67	
E-3025	#44, Willamette Transit					\$366.00

<u>Rentals as Reported on FC 1019</u>						
E-3019	#13609 K & E Level	200.00	15.00	8/15/42	82.50	10.50
E-3020	#1828410 KHM 26 Elite Typewriter)	151.75	3 mo. 32.50	8/ 5/42	65.00	7.56
E-3021	#2208669 KHM 11 Elite Typewriter)	425.00	20.00	10/ 1/42	80.00	14.01
E-3022	#370 Leupold & Volpel Transit	295.00	20.00	10/12/42	72.67	14.01
E-3025	#44, Willamette Transit					346.25

\$ 19.75  
 Difference due to error in  
 accruals caused by revision  
 in contract closing date.

REPORT OF STENOGRAPHER

SCHEDULE XI

Contract No. 5814

Date Mar. 12, 1943

Sheet 1 of 1

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NOTE

(Para. D) CONTRACTOR'S SALARY SCHEDULE

Date February 18, 1943

Contract No. 5614

Sheet 1 of 1

Badge No.	Name of Employee	Occupation	Maximum Pay Rate	Per Mo.-Wk. Da.-Wk.
* 2	Chas. A. McClure	Office Engineer	\$125	wk.
* 3	Geo. H. Kessler	Field Engineer	\$125	wk.
4	Harry H. Paul	Office Manager	\$115	wk.
6	James P. Larney	Asst. Engineer	\$100	wk.
* 9	Geo. H. Jones	Chief Architect	\$125	wk.
* 15	Ernest G. Rice	Asst. Engineer	\$100	wk.
* 36	John R. Reiff	Struct. Design Eng.	\$100	wk.
** 43	Lee A. Thomas	Arch. Draftsman-	\$ 82	wk.
** 44	Harold D. Marsh	" "	\$ 82	wk.
** 45	Wallace S. Hayden	" "	\$ 82	wk.
* 64	Thomas P. Taylor	Mech. Engineer	\$144	wk.
78	Geo. R. Pettingsall	E. & V. Engineer	\$144	wk.
110	Elis K. Cooper	Struct. Engineer	\$144	wk.
100	Wayne J. Siegenthaler	Asst. Office Mgr.	\$ 75	wk.

- \* Annual Leave at the end of Contract if employed Six Months or over.
- \*\* Overtime. Rate was for a 40 Hour Week - Overtime paid for all over 40 hours each week.

NOTE: At the end of this schedule, or as an appendage thereto, state what agreements were made or entered into for any compensation, beyond the maximum regular rate of pay, for overtime, travelling, lodging, subsistence, leaves of absence, or any other special allowances granted employees.

If the provisions did not apply to all employees listed in the schedule, indicate appropriately to whom they did apply.

APPROVED

Officer in Charge of Construction

JOHN W. CUNNINGHAM & ASSOCIATES

Contractor



## (Para. D) STATEMENT OF DISALLOWANCES

Date August 7, 1943Contract No. 5614Sheet 1 of 1

Transmittal Summary		Type of Expenditure & Reason for Disallowance	Amount
No.	Date		
61	3-14-43	Contractor Owned Rentals -	\$ 28.11
63	4-28-43	Rates not approved by Bureau of Yards & Docks	159.29
65	6-8-43	Penalty on Excise Tax Not approved by Navy Auditor	14.13.
<p>Items appearing on transmittal Summary No's 61 and 63 in the total amount of \$187.40 were deducted from the Contractor's Reimbursement Request in accordance with the Equipment Division's Audit of PC 508, Schedule IX of Subject Completion report.</p> <p>Item appearing on transmittal Summary No 65 in the amount of \$14.13 is penalty imposed by the U.S. Collector of Internal Revenue for negligence in making Compensation Tax payment - reimbursement for this penalty refused by Navy Auditor.</p>			
<p><i>E. F. Roerner</i>  E.F. Roerner, Lt. Comdr. (CEC)  USNR - Officer-in-Charge  Contract WOp-5614</p>			
TOTAL			\$ 201.53

Note: The Contractor will list here only those expenditures, disallowed for reimbursement, which he intends to present as a claim at some future date, and which have been excluded in his Release.

FINAL PROJECT COST REPORT

Date 6 August 1943

Contract NOy- 5614

Sheet 1 of 35

Project or Partial-project # 0, Title Property

Description:

This includes property surveys for main station and access railway, preparation of maps and descriptions and monumenting of all corners.

Quantity:

Item	Unit Cost	Total Cost
Labor. . . . .	\$	\$ 7202.21
Materials, Supplies and Warehouse Stock. . . . .		
Permanent Plant and Equipment. . . . .		
Lump Sum and Fee Subcontracts . . . . .		
Temporary Plant & Equipment, Oper. & Depr. . .		170.00
SUB TOTAL - Direct Cost	\$	\$ 7372.21
Proration of General Accounts <u>32.3836</u> %		6110.33
TOTAL COST	\$	\$ 13482.54

Remarks: This is a project not covered by the original contract, NOy-5614, but necessary and authorized by the Officer-in-Charge. Complete boundary line surveys were made for all tracts purchased for the main station and the access railway. Descriptions and maps were prepared for the Real Estate Section. After the property was acquired, permanent concrete monuments were set at all corners.

FINAL PROJECT COST REPORT

Date 6 August 1943

Contract NOy- 5614

Sheet 2 of 35

Project or Partial-project # 1, Title Railroad Connection

Description:

Location of access railway from Tillamook to the station, and preparation of complete plans and specifications for construction, including truss span across Trask River and several trestles.

Quantity:

Item	Unit Cost	Total Cost
Labor. . . . .	\$	\$7408.27
Materials, Supplies and Warehouse Stock. . . . .		
Permanent Plant and Equipment. . . . .		
Lump Sum and Fee Subcontracts . . . . .		
Temporary Plant & Equipment, Oper. & Depr. . .		174.86
SUB TOTAL - Direct Cost	\$	\$7583.13
Proration of General Accounts <u>82.8836</u> %		6285.15
TOTAL COST	\$	\$13868.28

Remarks: This work went beyond the preparation of plans and specifications, as called for in Contract NOy-5614. A complete location survey was made on the route finally constructed, and the line was staked and cross-sectioned for construction. Then, objections from property owners developed, and a new line was completely located, following a different route. The final decision was to construct on the first location made. Property surveys, maps and descriptions were prepared under Project O.

FINAL PROJECT COST REPORT

Date 6 August 1943

Contract NOy- 5614

Sheet 3 of 35

Project or Partial-project # 2, Title Clearing and Grading

Description:

This includes surveys and preparation of plans and specifications for clearing of over 250 acres of timbered land, stripping unsuitable material and grading for the landing area, mooring out circles, runways, and building areas.

Quantity:

Item	Unit Cost	Total Cost
Labor. . . . .	\$	\$ 3957.39
Materials, Supplies and Warehouse Stock. . . . .		
Permanent Plant and Equipment. . . . .		
Lump Sum and Fee Subcontracts . . . . .		
Temporary Plant & Equipment, Oper. & Depr. . .		93.41
SUB TOTAL - Direct Cost	\$	\$ 4050.80
Proration of General Accounts <u>82.8336</u> %		3357.44
TOTAL COST	\$	\$ 7408.24

Remarks: This project proved much more extensive than contemplated under Contract NOy-5614 and exceeded the original estimate of \$400,000. A considerable portion of the station area was covered with a very dense growth of spruce, alder and vine maple which had to be removed before any final surveys could be made. The ground was far from level, and it was cut up by drainage channels and swampy areas having a peat soil unsuitable for foundations. This had to be stripped and wasted. On account of the restriction to 1% slopes, the necessity of providing drainage for the heavy rainfall occurring in Tillamook, and the difficulty in securing suitable fill material, the yardage moved was far beyond original expectations.

The services rendered went beyond those required in Contract NOy-5614. Stakes were set for clearing and estimated for the subcontractor were prepared. Preliminary topography was taken and stakes were set for all general grading. Up to about September 15, 1942 all cross-section work was done for computing yardages. Thereafter, the cross-sectioning was done by the Sound Construction & Engineering Company.

FINAL PROJECT COST REPORT

Date 6 August 1943

Contract NOy-5614

Sheet 4 of 35

Project or Partial-project # 3, Title Hangar #1

Description:

The work done included supervision of foundations tests studies for location and establishment of grades, original stakes for construction, provision for utility services, and design of a transverse tunnel to carry heating pipes and utilities across the middle of the hangar.

Quantity:

Item	Unit Cost	Total Cost
Labor. . . . .	\$	\$ 2177.77
Materials, Supplies and Warehouse Stock. . . . .		
Permanent Plant and Equipment. . . . .		
Lump Sum and Fee Subcontracts . . . . .		
Temporary Plant & Equipment, Oper. & Depr. . .		51.40
SUB TOTAL - Direct Cost	\$	\$ 2229.17
Proration of General Accounts <u>82.8836</u> %		1847.61
TOTAL COST	\$	\$ 4076.78

Remarks:

Contract NOy-5614 did not include any services related to the hangar. In July and August, when the requirements of the contract were not known, all engineering related to the hangar was done by the Architect-Engineers. Test boring and soil loading tests were supervised and surveys made. Subsequently, this work was taken over by the construction contractor, except the design of the tunnel, above mentioned, which was done by the Architect-Engineers under instructions of the Officer-in-Charge.

# FINAL PROJECT COST REPORT

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Contract NOy- 5614

Project or Partial-project # 4, Title Mobile Mooring Masts & Services

## Description:

The grading for mooring out circles is considered part of project 2. Paving is considered part of project 26. Drainage is considered part of project 24. Work done under this project is the design of the mast anchorage, service pits, and underground conduits and service lines for water, helium, power and telephone.

## Quantity:

Item	Unit Cost	Total Cost
Labor. . . . .	\$	\$ <u>3359.24</u>
Materials, Supplies and Warehouse Stock. . . . .		
Permanent Plant and Equipment. . . . .		
Lump Sum and Fee Subcontracts . . . . .		
Temporary Plant & Equipment, Oper. & Depr. . .		78.82
SUB TOTAL - Direct Cost	\$	\$ <u>5418.06</u>
Proration of General Accounts <u>82.8836</u> %		2833.00
TOTAL COST	\$	\$ <u>8251.06</u>

## Remarks:

Services on this project conformed to Contract NOy-5614, being primarily related to the mast anchorage, paving, and services. However, they included substantially all the survey work for both design and construction.

FINAL PROJECT COST REPORT

Date 6 August 1943

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Sheet 6 of 35

Project or Partial-project # 5, Title Helium Storage and Distribution

Description:

Work done included location and establishment of grades for high-pressure helium storage and helium spheres, and studies for routes of proposed helium line.

Quantity:

Item	Unit Cost	Total Cost
Labor. . . . .	\$	\$ 185.61
Materials, Supplies and Warehouse Stock. . . . .		
Permanent Plant and Equipment. . . . .		
Lump Sum and Fee Subcontracts . . . . .		
Temporary Plant & Equipment, Oper. & Depr. . .		4.38
SUB TOTAL - Direct Cost	\$	\$ 189.99
Proration of General Accounts <u>82.8836</u> %		157.47
TOTAL COST	\$	\$ 347.46

Remarks:

Contract NOy-5614 did not contemplate any services on this project. The work done hereunder was in the early stages, before the contract had been received and its requirements known.

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Date 6 August 1943

Contract NOy- 6814

Sheet 7 of 35

Project or Partial-project # 6, Title Barracks

Description:

Complete plans and specifications were prepared under this project.

Quantity:

Item	Unit Cost	Total Cost
Labor. . . . .	\$	\$ 1089.92
Materials, Supplies and Warehouse Stock. . . . .		
Permanent Plant and Equipment. . . . .		
Lump Sum and Fee Subcontracts . . . . .		
Temporary Plant & Equipment, Oper. & Depr. . .		25.73
SUB TOTAL - Direct Cost	\$	\$ 1115.65
Proration of General Accounts <u>32.8836</u> %		924.69
TOTAL COST	\$	\$ 2040.34

Remarks:

Negatives of the Bureau Standard Barracks plans were not furnished. It was necessary to have tracings from which prints could be made for the contractor, and it appeared desirable to incorporate certain changes to make the design more suitable for the climatic conditions at Tillamook and provide for heating by sawdust fuel. Under authority of the Officer-in-Charge complete designs and specifications were prepared, but without substantial departure from the Bureau layout.



FINAL PROJECT COST REPORT

Date 6 August 1943

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Sheet 8 of 35

Project or Partial-project # 7, Title Mess Hall & Cold Storage  
# 3 bakery

Description:

Complete detailed plans and specifications for the building, mechanical equipment, and galley and bakery equipment were prepared.

Quantity:

Item	Unit Cost	Total Cost
Labor. . . . .	\$	\$ 2355.96
Materials, Supplies and Warehouse Stock. . . . .		
Permanent Plant and Equipment. . . . .		
Lump Sum and Fee Subcontracts . . . . .		
Temporary Plant & Equipment, Oper. & Depr. . .		55.61
SUB TOTAL - Direct Cost	\$	\$ 2411.57
Proration of General Accounts <u>82.8336</u> %		1998.80
TOTAL COST	\$	\$ 4410.37

Remarks:

The typical Bureau plans and the plans from other stations which were provided did not correspond in capacity to the requirements of this station. Also, they were in the form of white prints, not permitting duplication. It appeared necessary to prepare a complete original design, adapted to local climatic conditions, and providing for burning sawdust. The bakery was consolidated with the mess hall. The service rendered went far beyond the requirements of the contract.

FINAL PROJECT COST REPORT

Date 6 August 1943

Contract NOy- 5614

Sheet 9 of 35

Project or Partial-project # 7a, Title Cold Storage Building

Description:

Under this partial-project, all costs have been charged to project No. 7. Complete plans and specifications, including refrigeration equipment, were prepared.

Quantity:

Item	Unit Cost	Total Cost
Labor. . . . .	\$	\$
Materials, Supplies and Warehouse Stock. . . . .		
Permanent Plant and Equipment. . . . .		
Lump Sum and Fee Subcontracts . . . . .		
Temporary Plant & Equipment, Oper. & Depr. . .		
SUB TOTAL - Direct Cost	\$	\$
Proration of General Accounts _____ %		
TOTAL COST	\$	\$

Remarks:

In conference with the Officer-in-Charge and the Superintending Civil Engineer, it appeared desirable to curtail the refrigerated space to the two mess halls and build a separate Cold Storage building adjoining the railroad spur, adequate to receive an entire car-load of meat. This was actually another project, not included under Contract NOy-5614.

FINAL PROJECT COST REPORT

Date 6 August 1943

Contract NOy- 5614

Sheet 10 of 35

Project or Partial-project # 9, Title Bachelor Officers' Quarters

Description:

Completed detailed plans and specifications were prepared, separately, for the Senior and Junior Officers' Quarters.

Quantity:

Item	Unit Cost	Total Cost
Labor. . . . .	\$	\$ 776.26
Materials, Supplies and Warehouse Stock. . . . .		
Permanent Plant and Equipment. . . . .		
Lump Sum and Fee Subcontracts . . . . .		
Temporary Plant & Equipment, Oper. & Depr. . .		18.33
SUB TOTAL - Direct Cost	\$	\$ 794.59
Proration of General Accounts <u>82.8836</u> %		658.58
TOTAL COST	\$	\$ 1453.17

Remarks:

The work done was necessarily much more than the design of foundations as required under Contract NOy-5614. The schematic drawings furnished were not adequate for construction purposes, and complete detailed plans, including plumbing, heating, and electrical work were prepared for each of these buildings. Under a later authorization, a second Junior B.O.Q. was constructed from the same plans.

FINAL PROJECT COST REPORT

Date 6 August 1943

Contract NOy- 5614

Sheet 11 of 35

Project or Partial-project # 9a, Title Officers' Mess Hall

Description:

Complete detailed plans and specifications were prepared for this partial project. (Costs have been charged to Project No. 9)

Quantity:

Item	Unit Cost	Total Cost
Labor. . . . .	\$	\$ 1733.13
Materials, Supplies and Warehouse Stock. . . . .		
Permanent Plant and Equipment. . . . .		
Lump Sum and Fee Subcontracts . . . . .		
Temporary Plant & Equipment, Oper. & Depr. . .		40.90
SUB TOTAL - Direct Cost	\$	\$ 1744.03
Proration of General Accounts <u>32.3236</u> %		1470.38
TOTAL COST	\$	\$ 3214.41

Remarks:

The original listing of projects apparently contemplated a consolidation of the Officers' Mess with the B.O.Q. However, this did not appear feasible or desirable, in view of the requirement of dispersed construction. A complete original design for a separate building, including mechanical and electrical work, was prepared. The services went far beyond the design of Foundations, called for in Contract NOy-5614.

FINAL PROJECT COST REPORT

Date 3 August 1943

Contract NOy- 5614

Sheet 13 of 66

Project or Partial-project # 10, Title Officers' Quarters

Description:

Complete working plans, including plumbing, heating, and electrical work, were prepared separately for the Commanding Officer's and the Executive Officer's houses.

Quantity:

Item	Unit Cost	Total Cost
Labor. . . . .	\$	\$ 2705.02
Materials, Supplies and Warehouse Stock. . . . .		
Permanent Plant and Equipment. . . . .		
Lump Sum and Fee Subcontracts . . . . .		
Temporary Plant & Equipment, Oper. & Depr. . .		
SUB TOTAL - Direct Cost	\$	63.85
Proration of General Accounts <u>32.8336</u> %		2738.37
		2294.94
TOTAL COST	\$	\$ 5063.31

Remarks:

The cost included hereunder indicates a possibility that some costs on the Bachelor Officers' quarters were, through error, allocated to the Officers' Quarters. However, a large number of sketches and two sets of working drawings were prepared, in an effort to accomplish the impossible task of providing suitable residences within the limits of the appropriation, fixed.

FINAL PROJECT COST REPORT

Date 6 August 1943

Contract NOy- 5614

Sheet 13 of 35

Project or Partial-project # 11, Title Recreation Facilities & Ship's Service

Description:

Complete detailed plans and specifications were prepared. These included mechanical and electrical work, fixtures, and equipment for ship's store, stage equipment, designs for movable basket-ball boards, specifications for bowling alleys, etc.

Quantity:

Item	Unit Cost	Total Cost
Labor. . . . .	\$	\$ 2595.69
Materials, Supplies and Warehouse Stock. . . . .		
Permanent Plant and Equipment. . . . .		
Lump Sum and Fee Subcontracts . . . . .		
Temporary Plant & Equipment, Oper. & Depr. . .		61.27
SUB TOTAL - Direct Cost	\$	\$ 2656.96
Proration of General Accounts <u>32.3836</u> %		2202.18
TOTAL COST	\$	\$ 4859.14

Remarks:

The services rendered went beyond the requirements for design of foundations under Contract NOy-5614. The plans for other stations which were furnished did not appear suitable for several reasons, and were not in a form permitting reproduction. Preparation of complete designs was authorized by the Officer-in-Charge and the Superintending Civil Engineer.

FINAL PROJECT COST REPORT

Date 6 August 1943

Contract NOy- 5614

Sheet 14 of 35

Project or Partial-project # 12, Title Administration Building and  
Radio Receiving

Description:

Complete detailed plans and specifications, including mechanical and electrical work, were prepared.

Quantity:

Item	Unit Cost	Total Cost
Labor. . . . .	\$	\$ 1431.27
Materials, Supplies and Warehouse Stock. . . . .		
Permanent Plant and Equipment. . . . .		
Lump Sum and Fee Subcontracts . . . . .		
Temporary Plant & Equipment, Oper. & Depr. . .		33.78
SUB TOTAL - Direct Cost	\$	\$ 1465.05
Proration of General Accounts <u>82.8836</u> %		1214.29
TOTAL COST	\$	\$ 2679.34

Remarks:

This is the first building for which construction was undertaken. Only one set of blue prints of the South Weymouth plans were provided. Some alterations, to make the building more suitable for local conditions, and to provide for sawdust heating, were necessary. With the approval of the Officer-in-Charge a complete set of tracings were prepared. These, however, conformed as far as possible to the South Weymouth drawings.

FINAL PROJECT COST REPORT

Date 6 August 1943

Contract NOy- 5614

Sheet 15 of 35

Project or Partial-project # 13, Title Radio Transmitter Bldg.

Description:

Work done consisted of a topographical survey, and fixing of location for this building.

Quantity:

Item	Unit Cost	Total Cost
Labor. . . . .	\$	\$ 72.78
Materials, Supplies and Warehouse Stock. . . . .		
Permanent Plant and Equipment. . . . .		
Lump Sum and Fee Subcontracts . . . . .		
Temporary Plant & Equipment, Oper. & Depr. . .		1.72
SUB TOTAL - Direct Cost	\$	\$ 74.50
Proration of General Accounts <u>82.3336</u> %		61.75
TOTAL COST	\$	\$ 136.25

Remarks:

Work on this building was delayed, due to lack of agreement between the District Radio Materials Officer and the Bureau on the type of design. Only preliminary work on the site was done.



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Date 6 August 1943

Contract NOy- 5614

Sheet 16 of 35

Project or Partial-project # 14, Title Dispensary

Description:

Complete detailed plans and specifications, including the mechanical and electrical work, were prepared. The work included fitting into the rooms the special cabinets purchased from the Hamilton Manufacturing Co. and making detailed designs for other special millwork.

Quantity:

Item	Unit Cost	Total Cost
Labor. . . . .	\$	\$ 3294.71
Materials, Supplies and Warehouse Stock. . . . .		
Permanent Plant and Equipment. . . . .		
Lump Sum and Fee Subcontracts . . . . .		
Temporary Plant & Equipment, Oper. & Depr. . .		77.77
SUB TOTAL - Direct Cost	\$	\$ 3372.48
Proration of General Accounts <u>82.8836</u> %		2795.23
TOTAL COST	\$	\$ 6167.71

Remarks:

Services rendered on this partial-project conformed to the requirements of Contract NOy-5614. The dispensary was expanded from 15 beds to 30 beds, and plans were prepared (not built) for an isolation ward.

FINAL PROJECT COST REPORT

Date 6 August 1943

Contract NOy- 5614

Sheet 17 of 35

Project or Partial-project # 15, Title Station Maintenance and Utility  
Shop

Description:

Complete plans and specifications were prepared for this building.

Quantity:

Item	Unit Cost	Total Cost
Labor. . . . .	\$	\$ 122.34
Materials, Supplies and Warehouse Stock. . . . .		
Permanent Plant and Equipment. . . . .		
Lump Sum and Fee Subcontracts . . . . .		
Temporary Plant & Equipment, Oper. & Depr. . .		2.89
SUB TOTAL - Direct Cost	\$	\$ 125.23
Proration of General Accounts <u>82.8836</u> %		103.80
TOTAL COST	\$	\$ 229.03

Remarks:

Only one set of blueprints were provided from another station and these were for a building of cinder block construction, not adequate for use at this station. Instead of work only on foundations and fireproofing of roofs, complete plans and specifications were prepared.

FINAL PROJECT COST REPORT

Date 6 August 1943

Contract NOy- 5614

Sheet 18 of 35

Project or Partial-project # 16, Title Power Plant Building and Equipment

Description:

The final project could be more correctly described as a heating plant rather than a power plant, although it included a wing for future construction allowing installation of about 800 KW of Diesel engine capacity. The heating plant will serve both hangars and adjoining service buildings. Hog fuel (wood waste) will be burned, and plans for fuel handling facilities were included.

Quantity:

Item	Unit Cost	Total Cost
Labor. . . . .	\$	\$ 2203.28
Materials, Supplies and Warehouse Stock. . . . .		
Permanent Plant and Equipment. . . . .		
Lump Sum and Fee Subcontracts . . . . .		
Temporary Plant & Equipment, Oper. & Depr. . .		52.01
SUB TOTAL - Direct Cost	\$	\$ 2255.29
Proration of General Accounts <u>82.8836</u> %		1869.27
TOTAL COST	\$	\$ 4124.56

Remarks:

The Engineer-Architect handled extended negotiations which led up to a contract with the Bonneville Power Administration for electric power service, including the making of a connection with the lines of the Mountain States Power Co. for a limited standby. With such standby, the Diesel engine was considered unnecessary. The plant, as designed, included two 24,000 pound boilers, with all accessories induced draft apparatus, furnaces, and an elaborate fuel storage and handling system for sawmill waste. The building had reinforced concrete walls, a wooden roof, and a concrete stack.

FINAL PROJECT COST REPORT

Date 6 August 1943

Contract NOy-5614

Sheet 19 of 35

Project or Partial-project # 17, Title Fire Station and Garage

Description:

Complete plans and specifications were prepared for this structure.

Quantity:

Item	Unit Cost	Total Cost
Labor. . . . .	\$	\$ 959.41
Materials, Supplies and Warehouse Stock. . . . .		
Permanent Plant and Equipment. . . . .		
Lump Sum and Fee Subcontracts . . . . .		
Temporary Plant & Equipment, Oper. & Depr. . .		22.65
SUB TOTAL - Direct Cost	\$	\$ 982.06
Proration of General Accounts <u>82.3356</u> %		813.97
TOTAL COST	\$	\$ 1796.03

Remarks:

The typical plans furnished, from another station, showed an attached garage for ten cars and trucks. Only one set of blueprints was provided. After discussion with the Officer-in-Charge, and the Superintending Civil Engineer, it was decided to build the fire station for four pieces of apparatus and build a separate garage and repair shop for twenty cars and trucks with increased repair space. This has been designated partial-project No. 17a. While Contract NOy-5614 called only for design of foundations, complete plans and specifications, including mechanical and electrical work were prepared.

FINAL PROJECT COST REPORT

Date 6 August 1943

Contract NOy- 5614

Sheet 20 of 35

Project or Partial-project # 17a, Title Garage and Repair Shop

Description:

Complete plans and specifications were prepared for this structure.

Quantity:

Item	Unit Cost	Total Cost
Labor. . . . .	\$	\$
Materials, Supplies and Warehouse Stock. . . . .		
Permanent Plant and Equipment. . . . .		
Lump Sum and Fee Subcontracts . . . . .		
Temporary Plant & Equipment, Oper. & Depr. . .		
SUB TOTAL - Direct Cost	\$	\$
Proration of General Accounts _____ %		
TOTAL COST	\$	\$

Remarks:

See remarks under Project No. 17.

This is a partial project not covered by Contract NOy-5614.  
All costs have been charged to Project No. 17.

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Date 6 August 1943

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Sheet 21 of 35

Project or Partial-project # 18, Title Laundry

Description:

Complete plans and specifications were prepared for this building, including specifications for mechanical and electrical work, laundry equipment, and a dry cleaning plant.

Quantity:

Item	Unit Cost	Total Cost
Labor. . . . .	\$	\$ 1151.26
Materials, Supplies and Warehouse Stock. . . . .		
Permanent Plant and Equipment. . . . .		
Lump Sum and Fee Subcontracts . . . . .		
Temporary Plant & Equipment, Oper. & Depr. . .		27.17
SUB TOTAL - Direct Cost	\$	\$ 1173.43
Proration of General Accounts <u>82.8336</u> %		973.72
TOTAL COST	\$	\$ 2155.15

Remarks:

The services rendered went far beyond the requirements of Contract NOy-5614. Typical plans furnished were for a different station complement, and did not include a dry cleaning department. The plans prepared included a complete equipment layout.

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Date 6 August 1943

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Sheet 22 of 35

Project or Partial-project # 19, Title Gatehouse and Fence

Description:

Complete plans and specifications were prepared for the gatehouse. Specifications were prepared for fencing, and the fence line was staked on the ground for construction.

Quantity:

Item	Unit Cost	Total Cost
Labor. . . . .	\$	\$1343.49
Materials, Supplies and Warehouse Stock. . . . .		
Permanent Plant and Equipment. . . . .		
Lump Sum and Fee Subcontracts . . . . .		
Temporary Plant & Equipment, Oper. & Depr. . .		31.71
SUB TOTAL - Direct Cost	\$	\$1375.20
Proration of General Accounts <u>22.3356</u> %		1139.82
TOTAL COST	\$	\$2515.02

Remarks:

Contract NOy-5614 provided only for the design of foundations for the gatehouse. Services rendered were in excess of this requirement.

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Sheet 23 of 35

Project or Partial-project # 20, Title Storehouse

Description:

Complete plans and specifications were prepared, including mechanical and electrical work.

Quantity:

Item	Unit Cost	Total Cost
Labor. . . . .	\$	\$ 1089.39
Materials, Supplies and Warehouse Stock. . . . .		
Permanent Plant and Equipment. . . . .		
Lump Sum and Fee Subcontracts . . . . .		
Temporary Plant & Equipment, Oper. & Depr. . .		25.71
SUB TOTAL - Direct Cost	\$	\$ 1115.10
Proration of General Accounts <u>82.8836</u> %		924.24
TOTAL COST	\$	\$ 2039.34

Remarks:

Typical plans furnished showed a reinforced concrete platform and other use of critical materials. The designs which were made for this partial project eliminated such materials, and also reduced the cost. Under a subsequent authorization, a second storehouse was built from the same plans. Contract NOy-5614 called only for design of foundations.



FINAL PROJECT COST REPORT

Date 6 August 1943

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Sheet 24 of 35

Project or Partial-project # 21, Title Paint and Lube Oil Storage

Description:

Complete plans and specifications were prepared for this building.

Quantity:

Item	Unit Cost	Total Cost
Labor. . . . .	\$	\$ 252.00
Materials, Supplies and Warehouse Stock. . . . .		
Permanent Plant and Equipment. . . . .		
Lump Sum and Fee Subcontracts . . . . .		
Temporary Plant & Equipment, Oper. & Depr. . .		5.95
SUB TOTAL - Direct Cost	\$	\$ 257.95
Proration of General Accounts <u>82.8836</u> %		213.80
TOTAL COST	\$	\$ 471.75

Remarks:

Typical plans furnished showed a cinder block structure, which was not feasible for this station. A complete re-design was necessary.

FINAL PROJECT COST REPORT

Date 6 August 1943

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Sheet 25 of 35

Project or Partial-project # 22 , Title Gasoline Storage and Distribution  
23 , Title Fuel Oil Storage

Description:

Complete plans and specifications were prepared for all gasoline facilities except the storage tanks, which were the Bureau standard design. No fuel oil storage was designed, but extensive fuel handling facilities for sawmill waste took its place.

Quantity:

Item	Unit Cost	Total Cost
Labor. . . . .	\$	\$ 1826.63
Materials, Supplies and Warehouse Stock. . . . .		
Permanent Plant and Equipment. . . . .		
Lump Sum and Fee Subcontracts . . . . .		
Temporary Plant & Equipment, Oper. & Depr. . .		43.12
SUB TOTAL - Direct Cost	\$	\$ 1869.75
Proration of General Accounts <u>82.8836</u> %		1549.72
TOTAL COST	\$	\$ 3419.47

Remarks:

Work done on this project conforms to the contract, with the mill waste storage and handling system involving much more detailed design work than fuel oil storage tanks.

FINAL PROJECT COST REPORT

Date 6 August 1943

Contract NOy- 5614

Sheet 26 of 35

Project or Partial-project # 24, Title Utilities, including telephone, steam, water, sewer, and fire systems.

Description:

Complete plans and specifications were made for the steam distribution system, water system (including concrete reservoir), sanitary sewer system, and fire alarm system. General plans for the telephone lines were prepared. In addition to this, design and specifications were made for a very complete storm sewer and drainage system for the entire station, landing area, and mooring circles.

Quantity:

Item	Unit Cost	Total Cost
Labor. . . . .	\$	\$11,200.57
Materials, Supplies and Warehouse Stock. . . . .		
Permanent Plant and Equipment. . . . .		
Lump Sum and Fee Subcontracts . . . . .		
Temporary Plant & Equipment, Oper. & Depr. . .		264.38
SUB TOTAL - Direct Cost	\$	\$11,464.95
Proration of General Accounts <u>82.8836</u> %		9,502.55
TOTAL COST	\$	\$20,967.50

Remarks:

Subsequent to Contract NOy-5614, the station was enlarged to two hangars, with a necessary increase of all facilities. The need for drainage does not appear to have been recognized in the original contract and estimates for the station, though it is extremely important under the climatic conditions existing at Tillamook. A very elaborate storm sewer system was designed. Pipe sewers were provided for draining the 2,000 foot landing circle. Ditches and outlets were designed to get rid of storm water throughout the station area. In addition to designing, the Architect-Engineer made all preliminary and location surveys, and up to about Sept. 15, did all staking for construction.

FINAL PROJECT COST REPORT

Date 6 August 1943

Contract NOy- 5614

Sheet 27 of 35

Project or Partial-project # 25, Title Sewage Treatment Plant

Description:

Complete plans and specifications were prepared for a primary sewer treatment plant, including mechanical equipment, chlorinator, electrical installation, etc.

Quantity:

Item	Unit Cost	Total Cost
Labor. . . . .	\$	\$ 1020.36
Materials, Supplies and Warehouse Stock. . . . .		
Permanent Plant and Equipment. . . . .		
Lump Sum and Fee Subcontracts . . . . .		
Temporary Plant & Equipment, Oper. & Depr. . .		24.08
SUB TOTAL - Direct Cost	\$	\$ 1044.44
Proration of General Accounts <u>82.8366</u> %		865.67
TOTAL COST	\$	\$ 1910.11

Remarks:

Work done under this partial project conforms to the contract.

FINAL PROJECT COST REPORT

Date 6 August 1943

Contract NOy- 5614

Sheet 28 of 35

Project or Partial-project # 26, Title Roads, Walks, and Paving

Description:

Under this project is included the location, maps, profiles and specifications for grading and paving of all roads and streets within the station boundaries, maps and plans for sidewalks and bridges, and specifications for all paving of operating areas, including the landing area, runways, aprons and mooring circles.

Quantity:

Item	Unit Cost	Total Cost
Labor. . . . .	\$	\$16,003.03
Materials, Supplies and Warehouse Stock. . . . .		
Permanent Plant and Equipment. . . . .		
Lump Sum and Fee Subcontracts . . . . .		
Temporary Plant & Equipment, Oper. & Depr. . .		236.12
SUB TOTAL - Direct Cost	\$	\$10,239.15
Proration of General Accounts <u>82.8836</u> %		8,486.65
TOTAL COST	\$	\$18,725.80

Remarks:

It is obvious that the original estimate of \$175,000 for this project did not contemplate paving of operating areas, which was called for in later directives from the Bureau and is essential for rainfall conditions existing at Tillamook. This project was enlarged by the subsequent provisions for a second hangar. The services rendered went beyond the requirements of Contract NOy-5614, and included all preliminary surveys, location and staking of center lines for substantially all roads, and (up to about Sept. 15) the setting of slope stakes and plotting cross-sections for yardage calculation. Later, this work was taken over by the construction contractor.

FINAL PROJECT COST REPORT

Date 6 August 1943

Contract NOy- 5614

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Project or Partial-project # 27, Title Ammunition Storage

Description:

Made layout and located all structures. Prepared complete working drawings and specifications for Inert Storehouse.

Quantity:

Item	Unit Cost	Total Cost
Labor. . . . .	\$	\$ 358.57
Materials, Supplies and Warehouse Stock. . . . .		
Permanent Plant and Equipment. . . . .		
Lump Sum and Fee Subcontracts . . . . .		
Temporary Plant & Equipment, Oper. & Depr. . .		8.46
SUB TOTAL - Direct Cost	\$	\$ 367.03
Proration of General Accounts <u>82.8366</u> %		304.21
TOTAL COST	\$	\$ 671.24

Remarks:

Contract NOy-5614 provided only for services in connection with foundations. The size of the Inert Storehouse was changed by direction from the Bureau and complete plans and specifications were necessary for the new structure. The ammunition road and all structures were located, and elevations fixed.

FINAL PROJECT COST REPORT

Date 6 August 1943

Contract NOy- 5614

Sheet 30 of 35

Project or Partial-project # 28, Title Dope Shop and Storehouse

Description:

Made complete plans and specifications for reinforced concrete structure.

Quantity:

Item	Unit Cost	Total Cost
Labor. . . . .	\$	\$ 80.09
Materials, Supplies and Warehouse Stock. . . . .		
Permanent Plant and Equipment. . . . .		
Lump Sum and Fee Subcontracts . . . . .		
Temporary Plant & Equipment, Oper. & Depr. . .		1.89
SUB TOTAL - Direct Cost	\$	\$ 81.98
Proration of General Accounts <u>22.3333</u> %		67.95
TOTAL COST	\$	\$ 149.93

Remarks:

Plans furnished did not permit duplicating. Also, they were pre-war plans, requiring a large quantity of reinforcing steel. New designs were made, using higher unit stresses, and cutting down on critical materials.

FINAL PROJECT COST REPORT

Date 6 August 1943

Contract NOy- 5614

Sheet 31 of 35

Project or Partial-project # 29, Title Pigeon Loft

Description:

Topography was taken, and the structure was located for construction

Quantity:

Item	Unit Cost	Total Cost
Labor. . . . .	\$	\$ 22.59
Materials, Supplies and Warehouse Stock. . . . .		
Permanent Plant and Equipment. . . . .		
Lump Sum and Fee Subcontracts . . . . .		
Temporary Plant & Equipment, Oper. & Depr. . .		.53
SUB TOTAL - Direct Cost	\$	\$ 23.12
Proration of General Accounts <u>82.8836</u> %		19.16
TOTAL COST	\$	\$ 42.28

Remarks:

Services on this structure conformed to Contract NOy-5614.



FINAL PROJECT COST REPORT

Date 6 August 1943

Contract NOy- 5614

Sheet 32 of 35

Project or Partial-project # 30, Title Incinerator

Description:

Topography was taken, and this structure located, together with access roads.

Quantity:

Item	Unit Cost	Total Cost
Labor. . . . .	\$	\$ 13.43
Materials, Supplies and Warehouse Stock. . . . .		
Permanent Plant and Equipment. . . . .		
Lump Sum and Fee Subcontracts . . . . .		
Temporary Plant & Equipment, Oper. & Depr. . .		.32
SUB TOTAL - Direct Cost	\$	\$ 13.75
Proration of General Accounts <u>82.3836</u> %		11.40
TOTAL COST	\$	\$ 25.15

Remarks:

Services on this structure conform to Contract NOy-5614.

# FINAL PROJECT COST REPORT

Date 6 August 1943

Contract NOy- 5614

Sheet 33 of 35

Project or Partial-project # 31, Title Hangar #2

## Description:

Services on this structure were the same as for Hangar #1.

## Quantity:

Item	Unit Cost	Total Cost
Labor. . . . .	\$	\$ 772.52
Materials, Supplies and Warehouse Stock. . . . .		
Permanent Plant and Equipment. . . . .		
Lump Sum and Fee Subcontracts . . . . .		
Temporary Plant & Equipment, Oper. & Depr. . .		18.23
SUB TOTAL - Direct Cost	\$	\$
Proration of General Accounts <u>32.8636</u> %		790.75
		655.40
TOTAL COST	\$	\$ 1448.15

## Remarks:

When Contract NOy-5614 was executed, only one hangar was contemplated. All work done is to be considered an addition, though the contract specifically indicated that no services were expected in connection with the hangar.

FINAL PROJECT COST REPORT

Date 6 August 1943

Contract NOy- 5614

Sheet 34 of 35

Project or Partial-project # 49, Title Brig

Description:

Complete plans and specifications, including mechanical and electrical work, were prepared.

Quantity:

Item	Unit Cost	Total Cost
Labor. . . . .	\$	\$ 275.67
Materials, Supplies and Warehouse Stock. . . . .		
Permanent Plant and Equipment. . . . .		
Lump Sum and Fee Subcontracts . . . . .		
Temporary Plant & Equipment, Oper. & Depr. . .		6.51
SUB TOTAL - Direct Cost	\$	\$ 282.18
Proration of General Accounts <u>32.8336</u> %		233.88
TOTAL COST	\$	\$ 516.06

Remarks:

This is an additional project, not included in the original contract and estimates.

FINAL PROJECT COST REPORT

Date 6 August 1943

Contract NOy- 5614

Sheet 35 of 35

Project or Partial-project # 50, Title Equipment Transferred In  
Appropriation Purchase Account

Description:

- 1 Green Chevrolet Sedan, 1942, #BA233301, #6381215113
- 1 Blue Chevrolet Sedan, 1942, #BA326578, #6381217139

Quantity:

Item	Unit Cost	Total Cost
Labor. . . . .	\$	\$
Materials, Supplies and Warehouse Stock. . . . .		
Permanent Plant and Equipment. Salvage Value.		1627.90
Lump Sum and Fee Subcontracts . . . . .		
Temporary Plant & Equipment, Oper. & Depr. . .		
SUB TOTAL - Direct Cost	\$	\$ 1627.90
Proration of General Accounts _____ %		
TOTAL COST	\$	\$

Remarks:

Transferred without exchange of funds to Commanding Officer,  
Naval Air Station, Tillamook, Oregon

FINAL PROJECT COST REPORT

Date 20 Dec. 1943

Contract NOy-5614

Sheet 55a of 35

Project or Partial-project # 51, Title Additional Contractor's Fee

Description:

Supplemental Agreement #1 Dated Aug. 24, 1945

Quantity:

Item	Unit Cost	Total Cost
Labor. . . . .	\$	\$
Materials, Supplies and Warehouse Stock. . . . .		
Permanent Plant and Equipment. . . . .		
Lump Sum and Fee Subcontracts . . . . .		
Temporary Plant & Equipment, Oper. & Depr. . . . .		
SUB TOTAL - Direct Cost	\$	\$ <u>7000.00</u>
Proration of General Accounts _____ %		
TOTAL COST	\$	\$

Remarks:

NAVY DEPARTMENT  
BUREAU OF YARDS AND DOCKS

NY-5614

Date August 3, 1915

Subject: Agreement to Preserve all Documents,  
Records and Books of Account pertaining  
to Contract NY-5614

1. The Contractor shall preserve all documents, records and books of account pertaining to this contract, provided, however, that if the Contractor, at any time after the lapse of six (6) years following the date upon which the final payment under the contract becomes due, desires to dispose of said documents, records and books of account, he shall so notify the Contracting Officer, who shall either authorize their destruction or notify the Contractor to turn them over to the Government for disposition, and the Contractor shall promptly comply with such notice if given.

2. The Contractor agrees that adequate fire-proof storage ~~(will be)~~ (will be) provided.

The foregoing is accepted.

John W. O. ~~William & Associates~~

By 

These Records ~~(will be)~~ (will be) stored at:

Attie St. Spalding Bldg.  
(Place)

3rd & Washington  
(Address)

Portland  
(City)

Ore  
(State)

11 November 1943

STATEMENT OF DISPOSITION AND  
STORAGE OF SUBSTANTIATING PAPERS  
CONTRACT NOy-5614

This is to certify that all supporting papers in  
payment of Public Vouchers for Contract NOy-5614  
are stored in a fireproof vault at U. S. Naval Air  
Station, Tillamook, Oregon.

C. B. Harvey  
Lt. (jg), CEC USNR

Howard Grad  
Ensign, CEC USNR  
By direction.

TECHNICAL REPORT AND

PROJECT HISTORY

CONTRACT NQy-5424

Part "A"  
Sheet 1.



## P R E F A C E

Aerial view of the Naval Air Station (ITA), taken looking in a northeasterly direction showing Landing Circles, Mats and Heavier-than-air Runways, Hangars, Warehouses, Shops, Enlisted Men's Barracks and Mess, Dispensary, Recreation Bldg, Administration Bldg., B.O.Q.'s, Mess and other appurtenant buildings and utilities.

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# TABLE OF ADMINISTRATIVE DATA

## I. GENERAL

### Title:

Contract NOy-5424 for construction of lighter-than-air facilities at Tillamook, Oregon.

### Supplementary Agreements:

The following is a list of change orders to the original contract:

<u>Change No.</u>	<u>Proj. No.</u>	<u>Title</u>	<u>Date</u>
A	31	Additional hangar facilities	10/19/41
B	3	Hangar (6 ships)	11/26/41
	39	Bowling Alleys (4) in Enlisted Men's Recreation Building	
C	40	Handling and storing of collateral equipment	1/ 1/42
	41	Railroad connection (addition)	
	42	Helium storage and distribution (addition)	
	43	Barracks (222 men)	
	44	Bachelor officers' quarters (64 officers)	
	45	Dispensary (addition)	
	46	Fire station and garage (addition)	
	47	Utilities, including telephone, steam, water, sewer, fire system (addition)	
	48	Helium purification plant	
	49	Station brig	
D	38	Purchase and installation of dispensary x-ray and viewing equipment	3/ 6/42
E	51	Storage Garage	3/19/42
F	50	Reimbursement for Electric Power	4/ 1/42
G	52	60 low-cost defense housing family units with domestic equipment and accessories	4/19/42
	53	All necessary site development work, roads, walks, services and outside utilities for low-cost housing development	



TABLE OF ADMINISTRATIVE DATA

I. GENERAL

Supplementary Agreements: (continued)

<u>Change No.</u>	<u>Proj. No.</u>	<u>Title</u>	<u>Date</u>
H	54	Conversion of Contractor's Office to Administration Building Annex	4/29/41
I	55	Provide and install 30 KW engine generator, including wiring, etc., for emergency radio power	5/27/41
J	56	Work and material incident to installation of localizer	7/22/41
K	56	Sewage Treatment Plant (elimination of)	8/13/41
L	57	Installation of Equipment in Airship Maintenance Shops	8/26/41
M	54	Utilities, including telephone, steam, water, sewer, fire systems (reduction of)	10/14/41

Number and Name of Projects under Contract:

The following is a list of the numbers and names of the projects under the contract and change orders:

<u>Proj. No.</u>	<u>Title</u>	<u>Change Order No.</u>
1	Railroad Connection	
2	Clearing and Grading	
3	Hangar (6 ships)	
4	Mobile Hoisting Masts and Services	
5	Helium Storage and Distribution	
6	Barracks (436 men)	
7	Messhall and Cold Storage	
8	Bakery	
9	Bachelor Officers' Quarters (100 officers)	
10	Officers' Quarters (8 Quarters)	
11	Recreation Facilities and Ship's Service	
12	Administration Building and Radio Receiving	
13	Radio Transmitter Building	
14	Dispensary (30 beds)	
15	Station Maintenance and Utility Shop	
16	Power Plant Building and equipment	

Part "B"

Sheet 6.

TABLE OF ADMINISTRATIVE DATA

I. GENERAL

Number and Name of Projects under Contract: (continued)

<u>Proj. No.</u>	<u>Title</u>	<u>Change Order N</u>
17	Fire Station and Garage	
18	Laundry	
19	Gatehouse and Fence	
20	Storehouse	
21	Paint and Lube Oil Storage	
22	Gasoline Storage and Distribution	
23	Fuel Oil Storage	
24	Utilities, including Telephone, Steam, Water, Sewer, Fire System	
25	Sewage Treatment Plant	
26	Roads, Walks and Paving	
27	Ammunition Storage	
28	Dope Shop and Storehouse	
29	Pigeon Loft	
30	Incinerator	
31	Additional hangar facilities	A
32	Purchase and installation of dispensary X-ray and viewing equipment	D
33	Bowling Alleys (4) in Enlisted Men's Recreation Building	B
40	Handling and storing of collateral equip- ment	C
41	Railroad connection (addition)	C
42	Helium storage and distribution (addition)	C
43	Barracks (232 men)	C
44	Bachelor officers' quarters (64 officers)	C
45	Dispensary (addition)	C
46	Fire station and garage (addition)	C
47	Utilities, including telephone, steam, water, sewer, fire system (addition)	C
48	Helium purification plant	C
49	Station brig	C
50	Reinforcement for Electric Power	F
51	Storage Garage	E
52	60 low-cost defense housing family units with domestic equipment and accessories	G
53	All necessary site development work, roads, walks, services and outside utilities for low-cost housing development	G
54	Conversion of Contractor's Office to Admin- istration Building Annex	H

## TABLE OF ADMINISTRATIVE DATA

### I. GENERAL

#### Number and Name of Projects under Contract: (continued)

<u>Proj. No.</u>	<u>Title</u>	<u>Change Order</u>
55	Provide and install 30 KW engine generator, including wiring, etc., for emergency radio power	
56	Work and material incident to installation of localizer	I
57	Installation of Equipment in Airship Maintenance Shops	J L

#### Contractor:

Sound Construction & Engineering Co., a corporation organized and existing under the laws of the State of Washington, having a central office at 1012 Northern Life Tower, Seattle, Washington.

#### Insurance Company:

United Pacific Insurance Co., Rust Bldg., Tacoma, Washington.

#### Insurance Adviser:

Dawson & Field, Dexter Horton Bldg., Seattle, Washington.

#### Plans and Specifications by:

Bureau of Yards & Docks  
Architect-Engineer, NOy-5614

#### Engineering & Service Contractor:

None

#### Inspection of Materials:

Inspector of Naval Materials  
Navy Field Inspectors

#### Approval of Drawings:

Officer-in-Charge of Construction, NOy-5424

Part "B"  
Sheet 8.

## TABLE OF ADMINISTRATIVE DATA

### I. GENERAL

#### Source of Labor:

Local and labor imported from the rest of Oregon, as well as from the states of Washington, California, Idaho, Minnesota, Nebraska and other northwestern states were employed on this project.

#### Working Schedule:

In general the field forces worked nine hours per day, six days per week. Grading operations were carried on in two ten hour shifts per day, six days per week, and the maintenance shops worked three eight hour shifts seven days per week.

#### Priorities:

<u>Date</u>	<u>Priority</u>	<u>Certificate</u>
20 June 1942	A-1-a	Q849642
15 July 1942	(Re-rate) AA-3 on Projects 1 - 30, Form PD-4X USN 7.10	
6 January 1943	(Re-rate) AA-1 on Projects 5, 22, 23 Form PD-4X	
27 February 1943	(Re-rate) AA-2X on Projects 24, 47 - \$100,000 of remaining value under each project. Form PD-4X	
10 April 1943	AA-3 on Projects 52 and 53	
13 May 1943	AA-2X on One 30 KW Engine Gen- erator - Project 55	
23 August 1943	AA-2X on Project 56 - Localizer	



TABLE OF ADMINISTRATIVE DATA

II. TIME

Letter of Intent:

6 June 1942.

Contract Signed:

2 July 1942.

Preliminary Plans Issued:

6 July 1942.

Final Plans Issued:

30 June 1943.

Field Work Started:

6 July 1943.

Field Work Terminated:

15 October 1943.

Usable Completion:

The following is a list of projects and usable completion dates:

<u>Project Number</u>	<u>Title</u>	<u>Usable Date</u>
1 & 41	Railroad Connection	8/15/43
2	Clearing and Grading	9/15/43
3	Hangar "A"	10/15/43 ←
4	Mobile Mooring Masts & Services	7/ 1/43
5 & 42	Helium Storage & Distribution	10/ 1/43
6 & 43	Enlisted Men's Barracks	1/15/43
7	Messhall and Bakery	2/15/43
8	Cold Storage	3/10/43
9 & 44	Bachelor Officers' Quarters & Messhall	2/ 1/43
10	Officers' Residences	5/25/43
11	Recreation Facilities & Ship's Service	6/15/43
12	Administration Bldg. & Radio Receiving	1/ 1/43

TABLE OF ADMINISTRATIVE DATA

II. TIME

Usable Completion: (continued)

<u>Project Number</u>	<u>Title</u>	<u>Usable Date</u>
13 & 55	Radio Transmitter Building	10/ 1/43
14 & 45	Dispensary	5/15/43
15	Station Maintenance & Utility Shop	2/ 1/43
16	Power Plant Bldg. & Equipment	10/15/43
17 & 46	Fire Station and Garage	2/ 1/43
18	Laundry	3/29/43
19	Gatehouse and Fence	3/29/43
20	Storehouse	12/ 1/42
21	Paint and Lube Oil Storage	2/ 1/43
22	Gasoline Storage and Distribution	7/15/43
23	Fuel Storage	11/ 1/43
24 & 47	Utilities, including telephone, sewer, water, steam & fire systems	9/ 1/43
25	Sewage Treatment Plant	Deferred
26	Roads, Walks and Paving	10/ 1/43
27	Ammunition Storage	3/ 1/43
28	Dope Shop and Storehouse	8/10/43
29	Pigeon Loft	2/20/43
30	Incinerator	7/ 1/43
31	Hangar "B"	8/15/43
38	X-Ray and Viewing Equipment	8/20/43
39	Bowling Alleys - Recreation Bldg.	6/15/43
40	Handling & Storing Equipment	6/23/43
48	Helium Purification Plant	10/ 1/43
49	Station Brig	3/ 1/43
50	Reimbursement for Electric Power	-----
51	Storage Garage	8/ 1/43
52	60 Low Cost Housing Units	6/15/43
53	Site Development for Housing Units	6/ 1/43
54	Conversion of Contractor's Field Office	6/ 1/43
56	Localizer	6/15/43
57	Installation of Equipment in Airship Maintenance Shops	9/18/43

Office Work Terminated:

15 October 1943.

TABLE OF ADMINISTRATIVE DATA

II. TIME

% Field Work Completed:

93%

Total Contract Time:

469 Days.

Close Out Completed:

20 January 1944

TABLE OF ADMINISTRATIVE DATA

III. FISCAL

Appropriations: 17X1204(7) Public Works - Bureau of  
Yards and Docks

Allotments:

Number	
17X1204(7)-40	10,212,672.99
17X1204(7)-1-30	2,505,250.00
17X1204(7)-2-27	2,251,000.00
1731102-4	3,481.00
1731502(3)-13	15,100.00
1731502(3)-11	900.00
17-86X0105-4	169,260.00
17X0606-2 Title 13X1	3,887.10
1741502(3)-2	<u>9,712.50</u>

Total Allotments 15,171,263.50

Original Estimate of  
Cost at time of author-  
ization.

5,213,400.00

Additional authorizations,  
estimated.

9,957,863.50

Total Estimate of Cost

15,171,263.50

Actual Cost

Net Cost 15,340,749.33

Contractor's Fee 217,440.00

Total Net Construc-  
tion Cost (See Sec.  
4 Close Out Report)

15,123,309.33

Cost to complete

132,334.62

Final Cost

15,255,643.95

Total outstanding obli-  
gation at close out  
of contract. (Total  
summation of Sec. 5 to  
10 incl.)

81,629.18

Statement of overrun  
or underrun

(red) 169,485.00

Total Savings by utili-  
zation of Comprehensive  
Insurance Plan

185,312.91

TABLE OF ADMINISTRATIVE DATA

III. FISCAL (continued)

Actual salvage of property	<u>11,307.91</u>
Amount of salvage value lost to contract by transfer of property without exchange of funds.	<u>1,239,385.03</u>
Total possible salvage value of property (See Sec. 14)	<u>1,250,692.94</u>
Amount of contractor-owned equipment rental. (See Sec. 15)	<u>90,114.78</u>
Amount of "3rd party" equipment rental (See Sec. 16)	<u>512,479.53</u>
Total amount of equipment rental	<u>598,594.31</u>
Total value of equipment recaptured	<u>424,988.07</u>
Total value of purchased plant and equipment	<u>831,298.49</u>



TABLE OF ADMINISTRATIVE DATA

IV. PERSONNEL

NAVY

Officer-in-Charge:

Lt. Comdr. William J. Stribling (CEC)-V(S) USNR  
Date of Service: 29 June 1942 to 28 December 1942

Lt. Stoddard H. Martin (CEC)-V(S) USNR  
Date of Service: 28 December 1942 to 6 February 1943

Lt. Comdr. Earl F. Koerner (CEC)-V(S) USNR  
Date of Service: 6 February 1943 to 30 October 1943

Lt. Comdr. William I. Brown (CEC)-V(S) USNR  
Date of Service: 12 November 1943 to 17 December 1943

Lt. (jg) Cornelius B. Harvey (CEC)-V(S) USNR  
Date of Service: 17 December 1943 to Close

Assistant Officer-in-Charge:

Lt. Wilfred J. J. J. (CEC)-V(S) USNR  
Date of Service: 21 September 1942 to 13 February 1943

Ensign William A. Sidler (CEC)-V(S) USNR  
Date of Service: 21 September 1942 to 28 April 1943

Ensign Howard Grad (CEC)-V(S) USNR  
Date of Service: 18 September 1943 to Close

Contract Supt:

J. R. Reiff, Senior Civil Engineer.

Auditor:

V. R. Buckmaster  
B. F. Stacy

Inspector of Naval Materials:

Portland, Oregon for lumber. Inspection furnished at various points for miscellaneous materials.

Field Inspectors:

Kenneth C. Danstrom, Principal Inspector

## TABLE OF ADMINISTRATIVE DATA

### IV. PERSONNEL

#### Field Inspectors: (continued)

Jewell J. Johnson, Senior Structural Inspector  
William W. Main, Senior Electrical Inspector  
Fred C. Peters, Senior Mechanical Inspector  
John E. Samson, Civil Engineer (Concrete)  
William H. Stewart, Senior Paving Inspector  
Raymond Delivuk, Senior Concrete Inspector  
Donald K. Kilgore, Senior Concrete Inspector  
Harry E. Conway, Principal Equipment and Material Inspector

#### Miscellaneous Inspectors:

U. S. Army Engineers, Runway Loading Tests

#### CONTRACTOR

##### Officers of Firm:

Olney J. Gregg . . . . . Pres.  
\*Thos. H. Paul . . . . . V. Pres.  
Gail Q. Whitney . . . . . V. Pres.  
James A. Wickman . . . . . Sec'y  
\*Peter Kiewit . . . . . Treas.

\* Operating Committee

##### Job Manager:

R. H. Lukens  
D. A. Koehler, Asst. Proj. Mgr.

##### Superintendents:

E. O. Kelly, Gen'l Constr. Supt.  
Ross McDonald, Supt. Heavy Constr.  
C. G. Metcalf, Supt. Erection  
Joe Bierl, Mechanical Supt.

##### Chief Engineer:

C. A. Merriam

##### Chief Accountant:

Frank Wallace

TABLE OF ADMINISTRATIVE DATA

IV. PERSONNEL

Purchasing Agent:

J. C. Schwenk

Employment Manager:

Roy C. Himes



TABLE OF ADMINISTRATIVE DATA

V. SUBCONTRACTORS

<u>Name</u>	<u>Item</u>	<u>Amount</u>
C. H. Wheeler	Clearing	\$242,235.00
C. H. Wheeler	Grading	279,080.09
Hauser, Malcom, Tieslau	Laying Rails and ballast	53,936.60
C. T. Malcom Co.	R.R. Resurfacing and Realignment and Comple- tion of Track Work	12,872.00
Newbery-Chandler- Tillamook	Electrical Work	C.P.F.F.
General Installation Co.	Heating, Plumbing, Process Piping (heli- um Air, Gasoline)	C.P.F.F.

TABLE OF ADMINISTRATIVE DATA

VI. MATERIAL SUPPLIERS

<u>Name</u>	<u>Items</u>	<u>Amount</u>
Timber Structures, Inc.	Fabricated Trusses & Hdwe.	\$ 490,000.
Timber Structures, Inc.	Fire Treatment of Timber	46,550.
American Lbr. & Treating Company	Fire Treatment of Timber for Hangar	231,000.
Glenwood Lbr. Company	Lumber	14,300.
A. F. Coats Lbr. Co.	Lumber	248,000.
Willamette Valley Lbr. Company	Lumber	43,350.
Carnation Lbr. Company	Lumber	23,200.
Weyerhaeuser Lbr. Co.	Lumber	10,400.
V.K.V. Lumber Company	Lumber	58,500.
Silver Falls Lbr. Co.	Lumber	12,800.
Wauna Lumber Company	Lumber	30,000.
Pacific Portland Cement Company	Cement	99,000.
Rogers Construction Company	All Gravel except Concrete Aggregate	1,020,000.
Ross Island Sand & Gravel Company	Gravel, Sand and Concrete Aggregate	52,500.
Portland Sand & Gravel Company	Gravel, Sand and Concrete Aggregate	34,000.
McCormack Company	Concrete Pipe	78,500.
Salem Concrete Pipe Co.	Concrete Pipe	8,165.
Collins Concrete Pipe Company	Concrete Pipe	8,278.

TABLE OF ADMINISTRATIVE DATA

VI. MATERIAL SUPPLIERS

(Continued)

<u>Name</u>	<u>Items</u>	<u>Amount</u>
Hugh G. Purcel Company	Cast Iron Pipe, Fire Hydrants & Fittings	\$ 65,000.
Mercer Steel Company	Reinforcing Steel	24,200.
Columbia Steel Company	Reinforcing Steel	34,510.
Shell Oil Company	Road Oils and Asphalt	16,700.
Standard Oil Company	Road Oils and Asphalt	7,000.
Union Oil Company	Road Oils and Asphalt	12,000.
Shell Oil Company	Lube Oils, Greases & Diesel Fuel	60,000.
McKay Motor Company	Cars	23,488.
W. L. Reid Company	Building Hdwe. on all Buildings	10,500.
Dunham-Carrigan & Hayden	Miscellaneous Hdwe.	2,000.
D. N. & E. Walter Co.	Shades for various Buildings	686.
Tacoma Sash & Door Co.	Sash & Doors on Buildings	23,200.
McCracken & Ripley Co.	Roofing Material	43,000.
Paraffine Company	Roofing Material	17,000.
Lamb-Schrader Company	Various Building Materials	66,000.
Byrne Doors Co., Inc.	Furnish and Erect Hangar Doors	395,000.
N. Reuter & Sons'	Metal Doors - Ammunition Storage	2,050.

TABLE OF ADMINISTRATIVE DATA

VI. MATERIAL SUPPLIERS

(Continued)

<u>Name</u>	<u>Items</u>	<u>Amount</u>
Independent Iron Wks.	"I" Beams for Hangar and Monorail and Structural Steel for Door Guides	\$ 48,800
Seidlehuber Company	Door Guide Plates	4,600
Pittsburgh Paint & Glass Company	Paint	8,100
Hospital Supply Company	Sterilization Equipment for Dispensary	2,400
Westinghouse Supply Co.	X-ray Equipment for Dispensary	3,460
Hamilton Mfg. Company	Dispensary Furniture and Equipment	9,090
Wiley & Smith	Linoleum	4,000
Dohrmann Hotel Sup.	Officers' & Men's Mess Equipment	12,400
S. Birkenwald Company	Officers' & Men's Mess Equipment	4,900
J. W. McCray	Officers' & Men's Mess Equipment	2,875
Asbestos Supply Co.	Asbestos Board, Corrugated Asbestos Roofing, Acoustic Celotex	29,750
Los Angeles Bowling & Billiard Sup. Co.	Bowling Alleys	4,464
Chain Belt Company	Fuel Storage Handling Equipment	4,112
Chicago Bridge & Iron	Furnish & Erect Helium Storage Spheres	152,170

TABLE OF ADMINISTRATIVE DATA

VI. MATERIAL SUPPLIERS

(Continued)

<u>Name</u>	<u>Items</u>	<u>Amount</u>
A. O. Smith Corp.	Furnish & Erect Helium Storage Tanks	\$ 181,750.
Pope & Talbot	RR Ties & Treatment	12,400.
S. P. RR. Company	RR Switches, etc.	3,825.
Consolidated Supply	Valves, Pipe, Plumbing, Heating Equipment	41,800.
Peerless Pacific Co.	Valves, Pipe, Plumbing, Heating Equipment	18,000.
Crane Company	Valves, Pipe, Plumbing, Heating Equipment	4,700.
American Steel & Wire Company	Furnish & Erecting of Area Fence	24,800.
Ditto Sales & Service Company	Ditto Machines	3,020.
Erwin Hobbs & Company	Identification Badges	1,530.
Headlight Herald Co.	Printing	1,720.
Joe's Printing Service	Printing	1,750.
James Kerns & Abbot	Printing	713.
Pacific Manifold Book Company	Payroll Checks	600.
Williamina Clay Prod. Company	Common Brick	4,850.
Mountain States Power Company	Power	28,000.
Pacific T & T	Telephone Communication and Teletype	37,000.

TABLE OF ADMINISTRATIVE DATA

VI. MATERIAL SUPPLIERS

(Continued)

<u>Name</u>	<u>Items</u>	<u>Amount</u>
Tillamook Water Com.	Water	\$ 2,500.
Industrial Sales Co.	Oxygen & Acetylene	12,150.
Lamb Schrader Company	Oxygen & Acetylene	800.
Lincoln Elec. Company	Welding Rods	1,150.



# TABLE OF ADMINISTRATIVE DATA

## VII. PROGRESS PHOTOGRAPHS

<u>Number</u>	<u>Subject</u>	<u>Date Forwarded to Bureau</u>
15	Temporary Administration Building	29 October 194
16	Permanent Administration Building	"
18	Barracks	"
19	Mooring Circles #4, #5, and #6	"
20	2000' Landing Circle	"
21	Jr. B.O.Q. #1	"
22	Jr. B.O.Q. #2	"
23	Sr. B.O.Q.	"
24	Storehouse #1 (B)	"
25	Storehouse #2 (B)	"
26	Hanger #1 (A)	"
27	Drainage	"
28	Underground Gasoline Storage Tank #1	"
29	Underground Gasoline Storage Tank #2	"
40	Underground Gasoline Storage Tank #3	"
41	2000' Landing Circle	"
42	Mooring Circle #5	"
43	Mooring Circle #6	"
44	Railroad Trestle	"
45	Railroad Pill	"
46	Batch Plant and Stock Piles	"
47	Storm Sewer	"
48	Construction Camp	"
49	Road Mixing Plant	"
50	Barracks #1	"
51	Barracks #2 and #3	"
52	Enlisted Men's Mess Hall	"
53	Warehouse "D"	"
54	Road Ballast Stockpiles, etc.	"
55	Garage	"
57	Fire Station	"
58	Borrow Pit	"
59	Mooring Circle #5	"
60	Temporary Heavy Equipment Repair Shop	"
61	Storm Drain across 2000' Landing Circle	"
62	Warehouse "A"	"
63	Warehouse "B"	"
64	Construction Camp	"
65	Senior B.O.Q. and Jr. B.O.Q. #2	"
66	Jr. B.O.Q. #1	"
67	Equipment Pool	"
68	Hot Plant	"
82-A	Hanger Truss Model	4 November 194
82-B	Hanger Truss Model	"
82-C	Hanger Truss Model	"

# TABLE OF ADMINISTRATIVE DATA

## VII. PROGRESS PHOTOGRAPHS

<u>Number</u>	<u>Subject</u>	<u>Date Forwarded to Bureau</u>
102	Circle #6	27 November 1942
104	R. R. Bridge and North Approach	"
105	Inundated Pasture Land	"
109	Water Over Highway	"
73	Fire Station	29 December 1942
74	Paint Shop and Station Maintenance	"
75	Men's Mess Hall	"
76	Helium Storage	"
77	Railroad Track	"
78	Railroad Bridge	"
85	Gravel Supply Source	"
86	Ditch and Spoil Piles	"
87	Ditch in Front of Barracks	"
99	Grading in E.O.Q. Area	"
100	Taxiways to Circles #4, #5, and #6	"
112	E.O.Q. Area	"
114	Blimp Boulevard in Barracks Area	"
118	Site of Hangar "B"	"
116	Site of Hangar "B"	"
120	Dedication of Naval Air Station	"
121	Dedication of Naval Air Station	"
124	Forms in Place for Gas Tank Slab	"
133	Railroad Trackage	"
140	Laundry	"
145	N.E. Corner--Hangar "B"	"
147	Enlisted Men's Barracks & Mess Hall	"
148	Bachelor Officers' Quarters	"
149	Gasoline Storage	"
157	Contractor's Temporary Warehouse	8 March 1943
163	Boundary Fence	"
164	Gravel Pit	"
165	Barracks and Blimp Boulevard	"
166	General View of Station	"
167	Hangar "B"	"
168	North Door Tower of Hangar "B"	"
169	Hangar "B"	"
171	North Door Tower, Hangar "B"	"
173	Hangar "B"	"
174	Substation Site & Bonneville Entrance Line	"
178	Recreation Building	"



# TABLE OF ADMINISTRATIVE DATA

## VII. PROGRESS PHOTOGRAPHS

<u>Number</u>	<u>Subject</u>	<u>Date Forwarded to Bureau</u>
179	Hanger "B"	15 April 1943
180	Hanger "B"	"
182	Hanger "B"	"
189	Assembled Truss Sections in Yard	"
193	Erection of Center Truss Section	"
194	Center Truss Section in Place	"
195	Methods of Making Connection at Panel Point 8	"
196	Making Panel Point 8 Connection	"
197	Hanger "B"--Setting Arch	"
198	Hanger "B"--Door Pockets and Trusses	"
199	Hanger "B"--Placing Section of Monitor	"
202	Hanger "B"--Erection of Trusses	25 May 1943
203	Hanger "B"	"
204	Hanger "B"--Erection Methods	"
TMK 103	N.A.S.--Looking Northeast	"
TMK 108	Hanger "B"--Looking East	"
TMK 108	Hanger "B" and Lumber Yard	"
TMK 109	Hanger "B"--North End	"
TMK 110	Hanger "B" and Lumber Yard	"
TMK 112	Hanger "A", Site of	"
TMK 114	General View of Buildings	"
TMK 116	Landing Circles	"
211	Hanger "B"--Setting of Last Truss	29 June 1943
212	Hanger "B"--Setting of Last Truss	"
213	Hanger "B"--North End	"
214	Hanger "B"--South End	"
215	Hanger "B"--3/4 View	"
216	Hanger "B"--Northwest End	"
220	Moving Door Girder Scaffold to Hanger "A"	30 August 1943
221	Moving Door Scaffold Into Place	"
223	Hoisting First Arch on Hanger "A"	"
225	Hanger "A"	"
226	Hanger "A" from Topside of Hanger "B"	"
227	Erection of Last Truss on Hanger "A"	"

OUTLINE OF NARRATION

I. AUTHORITY

A. Bureaus involved

Bureau of Aeronautics  
Bureau of Yards & Docks

OUTLINE OF NARRATION

I. AUTHORITY

B. Original Directives on Need of Facility

(Omitted as per Cir Let 290-43)

## OUTLINE OF NARRATION

### I. AUTHORITY

#### C. Brief Description of the Facility

The project consists of the construction of facilities for a Lighter-Than-Air Naval Air Station, complete with 2 LTA & ship hangars, landing mats, circles, HTA runways and appurtenant buildings for operation and maintenance.

## OUTLINE OF NARRATION

### I. AUTHORITY

#### D. Authorization

The authority for construction of the projects under this contract is contained in the Naval Appropriation Act, 1943, identified by the title, "Public Works, Bureau of Yards & Docks."

## OUTLINE OF NARRATION

### II. GENERAL

#### A. Design

##### 1. Organization

##### a. Bureau

The Bureau of Yards and Docks furnished plans for the following projects:

#### Project Number

27	Ammunition Storage
28	Depe Shop & Storehouse
3	Hangar
5	Helium Storage & Distribution
29	Pigeon Loft
30	Incinerator
31	Hangar (addition)
42	Helium Storage & Distribution (addition)
43	Barracks (addition)
44	Bachelor Officers' Quarters (addition)

## OUTLINE OF NARRATION

### II. GENERAL

#### A. Design

##### 1. Organization

##### b. Station

Station personnel was not employed on the design of any projects.

## OUTLINE OF NARRATION

### II. GENERAL

#### A. Design

##### 1. Organization

##### c. Architect & Engineer

The Architect-Engineer, John W. Cunningham & Associates, 1112 Spalding Building, Portland, Oregon, designed the following projects:

- 1 Railroad connection
- 2 Clearing and grading
- 4 Mobile mooring masts and services
- 6 Barracks (456 men)
- 7 Messhall and bakery
- 8 Cold storage building
- 9 Bachelor officers' quarters (100 officers) and officers' messhall
- 10 Officers' quarters (2)
- 11 Recreation building and ship's service
- 12 Administration building and radio receiving
- 14 Dispensary (30 beds)
- 15 Station maintenance and utility shop
- 16 Power plant building and equipment
- 17 Fire station and garage
- 18 Laundry
- 19 Gatehouse and fence
- 20 Storehouse
- 21 Paint and lube oil storage
- 22 Gasoline storage and distribution
- 23 Fuel oil storage
- 24 Utilities (including telephone, steam, water, sewer, fire systems)
- 25 Sewage treatment plant (project cancelled)
- 26 Roads, walks, paving



## OUTLINE OF NARRATION

### II. GENERAL

#### A. Design

##### 1. Organisation

##### a. Architect & Engineer (continued)

- \*27 Ammunition storage
- \*28 Dope shop and storehouse
- 41 Railroad connection (addition)
- 45 Dispensary (addition)
- 46 Fire station and garage (addition)
- 47 Utilities (addition)
- 48 Helium purification plant
- 49 Station brig

\*Redesign of foundations by Architect-Engineer

## OUTLINE OF NARRATION

### II. GENERAL

#### A. Design

##### 1. Organization

##### d. Contractor

The following project was designed by the  
Sound Construction & Engineering Company  
with approval by the District Radio Material  
Officer:

Project No. 13      Radio Transmitter Building

## OUTLINE OF NARRATION

### II. GENERAL

#### A. Design

##### 2. Criteria

Criteria of design was based on semi-permanent construction. Budocks standard specifications, amended by war-time restrictions on critical materials, were used as standards of design. The Architect-Engineer supplemented these standards with various joint committee specifications.

The entire project consists of the construction of facilities for a Lighter-than-Air Naval Air Station complete with two wooden LTA 6-ship hangars (fire treated lumber), landing mats, circles, HPA runways, and appurtenant buildings for operation and maintenance.

## OUTLINE OF NARRATION

### II. GENERAL

#### B. Selection of Architect & Engineer

Selection of the Architect-Engineer, John W. Gunningham & Associates, was made by the Bureau of Yards and Docks via the 13th Naval District Public Works Office.

## OUTLINE OF NARRATION

### II. GENERAL

#### C. Selection of Contractor

Selection of the Contractor was made by the Bureau of Yards and Docks.

## OUTLINE OF NARRATION

### II. GENERAL

#### D. Letter of Intent to Contractor

Letter of intent (copy appended) dated 6 June 1942 was issued to the Prime Contractor, Sound Construction & Engineering Company, 1012 Northern Life Tower, Seattle, Washington.

NAVY DEPARTMENT  
Bureau of Yards & Docks  
Washington, D.C.

NOy-5424.

June 6, 1942.

Gentlemen:

Acting under the authority of the First War Powers Act, 1941, to enter into contracts without regard to the provisions of law relating to the making, performance, amendment, or modification of contracts in order to facilitate the prosecution of war, the Navy Department intends to award to you a cost-plus-a-fixed-fee construction contract to accomplish the completion of the following enumerated public works projects at the location indicated, each project being designated by general title and the approximate estimated cost of each being stated to indicate generally its degree of magnitude and not as a limit of cost, viz:

<u>TILLAMOOK, OREGON</u>			
<u>Project No.</u>	<u>Title of Project</u>	<u>Approximate Estimated Cost</u>	<u>Allotment No.</u>
1 - 30 inclusive	See attached sheet		

Total including Contractor's Fee \$5,213,400 17x1204(7)-23

The maximum amount of fee which can be allowed on projects of this nature is fixed by law at 6% of the total estimated cost less the fee. The actual fee will be determined at the Bureau prior to the signing of the contract.

You are authorized and requested to begin work under the proposed contract immediately so that the construction may be expedited. Reimbursement will be made to you by the Government for obligations incurred on account of this work and under this authorization prior to the execution of the contract, on submission of public vouchers approved by the Officer-in-Charge of Construction and the Bureau of Yards & Docks.

Bureau's standard form of cost-plus-fixed-fee construction contract will be used. The contract number assigned to this contract is NOy-5424.

Part "C"  
Sheet 39a

Payments under this contract may be assigned pursuant to the Assignment of Claims Act of 1940 and will not be subject to reduction or set-off for any indebtedness of the contractor to the United States arising independently of this contract.

For further information you are referred to Lieutenant Commander W. J. Stribling, (CEC- V(S)), USNR, who has been designated Officer-in-Charge of Construction under the proposed contract, address to be furnished at a later date.

If the above is satisfactory to you, it is requested that you indicate your acceptance of this letter of intent in the space provided therefor on the original and the three copies enclosed, and that you return to the Bureau the original and two copies with your acceptance noted on each, retaining the remaining copy for your files.

Very truly yours,

(Stamped)

E. Moreell  
Chief of Bureau

Sound Construction & Eng. Co.  
Seattle, Washington

CC: Commandant, Thirteenth Naval District  
Supt. Civil Engineer for Area No. 7

ACCEPTED:

June 12, 1942

Sound Construction & Engineering Co.

By /s/ Okey J. Gregg.  
President



NOY-5424

LIGHTER-THAN-AIR FACILITIES,  
TILLAMOOK, OREGON

Project No.	Title	Estimated Cost Including Fee
1	Railroad Connection	\$ 160,000
2	Clearing and Grading	400,000
3	Hanger (6 ships)	1,500,000
4	Mobile Mooring Masts and Services	45,000
5	Helium Storage and Distribution	225,000
6	Barracks (456 men)	161,000
7	Messhall and Cold Storage	150,000
8	Bakery	30,000
9	Bachelor Officers' Quarters (100 officers)	175,000
10	Officers' Quarters (2 Quarters)	19,400
11	Recreation Facilities and Ship's Service	120,000
12	Administration Building and Radio Receiving	90,000
13	Radio Transmitter Building	62,000
14	Dispensary (30 beds)	77,000
15	Station Maintenance and Utility Shop	27,000
16	Power Plant Building and equipment	380,000
17	Fire Station and Garage	51,000
18	Laundry	43,000
19	Gatehouse and Fence	32,000
20	Storehouse	100,000
21	Paint and Lube Oil Storage	8,000
22	Gasoline Storage and Distribution	160,000
23	Fuel Oil Storage	27,000
24	Utilities, including Telephone, Steam, Water, Sewer, Fire Systems	800,000
25	Sewage Treatment Plant	60,000
26	Roads, Walks and Paving	175,000
27	Ammunition Storage	100,000
28	Dope Shop and Storehouse	20,000
29	Pigeon Loft	6,000
30	Incinerator	10,000
	Net Amount	\$5,078,400
	Plus Fee	135,000
	Total	\$5,213,400

## OUTLINE OF NARRATION

### II. GENERAL

#### E. Purpose of Contract

The purpose of the contract was to construct the projects required for the Lighter-than-Air Naval Air Station, Tillamook, Oregon in accordance with the provisions of N0y-5424.

## OUTLINE OF NARRATION

### II. GENERAL

#### F. Scope and Brief Description of Work

##### 1. Original

The original scope of the contract covered thirty projects in conjunction with the construction of one lighter-than-air hangar to accommodate six ships. The list of these projects is as follows:

<u>Project Number</u>	<u>Title</u>
1	Railroad Connection
2	Clearing and Grading
3	Hangar (6 ships)
4	Mobile Mooring Masts and Services
5	Helium Storage and Distribution
6	Barracks (456 men)
7	Messhall and Cold Storage
8	Bakery
9	Bachelor Officers' Quarters (100 officers)
10	Officers' Quarters (2 Quarters)
11	Recreation Facilities and Ship's Service
12	Administration Building and Radio Receiving
13	Radio Transmitter Building
14	Dispensary (30 beds)
15	Station Maintenance and Utility Shop
16	Power Plant Building and Equipment
17	Fire Station and Garage
18	Laundry
19	Gatehouse and Fence
20	Storehouse
21	Paint and Lube Oil Storage
22	Gasoline Storage and Distribution
23	Fuel Oil Storage

## OUTLINE OF NARRATION

### II. GENERAL

#### F. Scope and Brief Description of Work

##### 1. Original (continued)

<u>Project Number</u>	<u>Title</u>
24	Utilities, including Telephone, Steam, Water, Sewer, Fire Systems
25	Sewage Treatment Plant
26	Roads, Walks and Paving
27	Ammunition Storage
28	Dope Shop and Storehouse
29	Pigeon Loft
30	Incinerator

## OUTLINE OF NARRATION

### II. GENERAL

#### F. Scope and Brief Description of Work

##### 2. Additional

Additional projects became necessary due to the addition of another Hangar to the original scope of the contract. This addition required another Barracks Building (228 men), another EOQ Building (64 officers) and additional Helium Facilities doubling the original facilities as well as adding a Helium Repurification Building. Other minor projects which were added are as follows: X-ray and Viewing Equipment for the Dispensary, Bowling Alleys (4) in the Recreation Building, a Station Brig, Localizer, Housing Project, Standby Generating Unit for the Radio Transmitter Building, and a Storage Garage.

The project for a Bakery was consolidated with the Messhall, and a Cold Storage Building was constructed as an independent structure. Sawdust storage and handling equipment was substituted for fuel oil storage, and the projects for an Incinerator and for a Sewage Treatment Plant were eliminated as being unnecessary at the present time.

## OUTLINE OF NARRATION

### II. GENERAL

#### G. Details of Site

##### 1. Acquisition of Property

###### a. Cost

The total fixed liability for the station proper as of 1 September 1943 was \$249,826 with two parcels of land remaining undisposed which will approximate \$32,000 additional. For the railroad right-of-way from the City of Tillamook to the Naval Air Station the total fixed liability as of 1 September 1943 was \$49,969. Jury trial on a parcel awaiting action will probably increase the amount by \$2,000.

OUTLINE OF NARRATION

II. GENERAL

G. Details of Site

1. Acquisition of Property

b. Legal Action

Property acquisition was accomplished by  
condemnation.

## OUTLINE OF NARRATION

### II. GENERAL

#### G. Details of Site

##### 1. Acquisition of Property

##### a. Former Use

All cleared property was formerly used for dairying and farming in conjunction with the dairy industry.



## OUTLINE OF NARRATION

### II. GENERAL

#### G. Details of Site

##### 2. Location, Description and Size

The station is located approximately four miles south of the City of Tillamook covering an area of 1965.32 acres of which approximately 75 per cent is usable. This portion is flat, and was generally clear before the site was obtained. The eastern part of the station is hilly and heavily wooded; and, being of little use, has been left in its original state.

## OUTLINE OF NARRATION

### II. GENERAL

#### G. Details of Site

##### 3. Reasons for Selection

A proposed preliminary site plan was furnished by Budocks at the inception of this project. Individual buildings and facilities were located in accordance with this plan wherever feasible. In some instances soil conditions and topography dictated the site selection. In the case of the Radio Transmitter Building the final site was selected by the District Radio Material Office.

## OUTLINE OF NARRATION

### II. GENERAL

#### G. Details of Site

##### 4. Topography

The topography is generally flat with the exception of the eastern portion of the station. The average elevation of the ground in the cleared area is about 25 feet above M.S.L., while in the unimproved area the elevations range from 50 feet to a maximum of 365 feet above M.S.L.

## OUTLINE OF NARRATION

### II. GENERAL

#### G. Details of Site

##### 5. Geology

The buildings of the station are located on what was formerly the southerly end of Tillamook Bay. Numerous changes in the location of streams flowing into the bay at this point have resulted in deposits of gravel, silt, and clay. No definite formation is apparent even after excavating for foundations.

## OUTLINE OF NARRATION

### II. GENERAL

#### G. Details of Site

##### 6. Soil Characteristics

The subsurface was composed of layers of silt, gravel, and clay. The actual surface gave no indication of what might be found after excavating, and direct reversals of anticipated formations were experienced on many occasions. The surface was composed of a peaty material including partly decomposed vegetable matter, twigs, branches, etc. This material was the result of a swampy condition due to a heavy run-off of ground water.

## OUTLINE OF NARRATION

### II. GENERAL

#### G. Details of Site

##### 7. Unusual Characteristics

The most severe characteristic prevalent during construction was the heavy rate of rainfall and the resultant run-off. During the month of November, 1942 the rainfall amounted to 18.57 inches, while the following month, December, exceeded this amount by one inch. The clay soil during this period and until late spring was very difficult to move thereby seriously handicapping clearing and grading.

## OUTLINE OF NARRATION

### II. GENERAL

#### C. Details of Site

##### 8. Existing Available Facilities

The station is located in an agricultural district, and consequently it was not anticipated that adequate facilities would be available. However, the main supply lines for the City of Tillamook traversed the western portion of the station, and it was possible to develop a suitable water system as well as a storage reservoir at relatively small expense. The generating capacity of the local power company was not deemed adequate to supply the station demands as well as the local commercial load and, after investigation by the Architect-Engineer, possibility of expansion was found to be impractical.

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### A. Construction History

##### 1. Procedure & Method Utilized

Most of the procedure and methods used on this project were customary methods as used in the construction of roads, walks, paving, grading and light frame buildings. However, some of the features of this station were new, novel or, on account of local conditions, difficult of execution.

The most outstanding of the unusual tasks involved in the construction of this station was the assembly and erection of the timber arched trusses for the two hangars. The dimensions of this framework were of such vast extent that precedent in the erection was lacking and, consequently, several different techniques were studied. The procedure developed at Tillamook was unique and involved the use of a minimum of "hard-to-get" equipment and critical materials.

Truss members and bracing were delivered to the site cut to length, grooved for rings and bored for bolts.

This material as well as the necessary hardware was segregated and piled adjacent to jigs for rapid and economical handling. Lumber carriers were used in moving the lumber to and from the stockpiles and to the jigs. The jigs and the lumber storage yard were located on the site of the Landing Circle accessible to both hangars.



## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### A. Construction History

##### 1. Procedure & Method Utilised (continued)

Trusses were completely assembled while on the jigs and all connections were made and bolted. After this they were taken apart in four sections to be moved into the hangars. Where shear plates were used at field connected panel points, the holes were reamed for tight-fitting bolts.

After truss sections were removed from the jigs, but before erection, conduits, supports for the lighting fixtures and everything possible were installed on the ground to minimize the amount of work to be done after erection. This was desirable, not only from the standpoint of economy, but also because the timbers, particularly in damp weather, became slippery and highly hazardous to climb around on and the selected method of erection provided no scaffolding from which men could work.

A scale model, 1/4" to the foot, was made of several of the trusses, the concrete bents, derricks and other equipment in order to study methods of erection, placement of the equipment and placement and handling of the material. This study proved so useful that the plan arrived at by experimenting with the model was carried through in detail and no major changes were made in the field.

The plan adopted for erection of the trusses contemplated the use of two stiff leg derricks each mounted on standard gauge railway trucks and tied together with heavy timbers to be moved in unison along three lines of track, one down the center line of the hangar, the others fifty feet each side of the center line.

The derricks were of steel, with electric motor-driven hoisting equipment and originally had 150 booms. These derricks were designed and used on the construction of Mud Mountain Dam lo-

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### A. Construction History

##### 1. Procedure & Method Utilised (continued)

sited near North Bend, Washington. For this work the booms were extended to 190 feet and were provided with 15-foot jibs to handle the lighter bracing material.

In addition to the two stiff leg derricks there were three crawler cranes used in the various phases of the operation.

While the derricks were being assembled, work proceeded on the concreting of door pockets and concrete bents, starting at the N.E. end of Hangar "B". This work was done far enough in advance of the truss erection to allow the concrete in the door pockets to set up and to clear the way for the derricks.

The completed door pocket pylons were used to steady the first truss erected and in addition, two gin poles were set 44 feet to each side of the center line of the hangar and just off of the center line of truss #51 for the same purpose. The upper and lower chords of the first truss erected (truss #51) were lashed to the gin poles and door pocket pylons at their intersection. The gin poles were intended to give stability to the partially erected structure until a sufficient number of trusses had been erected, without introducing a component of load on the truss as would be the case in a wind if the truss itself had been held by guy lines.

The gin poles were 170 feet long, each of two sticks spliced together, butt to butt.

The trusses were brought into the hangars in four sections and erected in three. The connection at the crown, panel point 8-18, was made on the ground in front of the derricks just before this section was hoisted in place.

The lower sections, 0a-81, for six trusses that were erected first, were located by means of a

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### A. Construction History

##### 1. Procedure & Method Utilized (continued)

transit and a target located at the panel point, and held in exact location by means of guy lines to dead men and bracing between chords, these were completely installed up to panel point 5f, before the upper sections were placed.

To provide a scaffold to work from in making the field connection at panel point 8i, suitable members were bolted to the section before erection. The connection at this point was made by means of shear plates. The 13/16 holes were reamed to 7/8" while the truss sections were on jigs. To minimize movement in the joint, 7/8" bolts were used in the 7/8" holes. The truss anchorage shoes were redesigned to replace those originally shown in order to facilitate erection, and 7/8" bolts in reamed holes were used here as well. No trouble was experienced in landing the sections on the foundation bolts nor in making the field connection at panel point 8i.

The upper sections of the trusses were brought in from the rear in two pieces on specially constructed logging trucks, and were laid on blocks in front of the stiff leg derricks. After connections were made at the crown, the sections were lifted until clear of the floor and then turned into the vertical with the assistance of crawler crane hitches at points 9j.

The first truss erected in each hangar was made fast to the gin poles and door pocket pylons as described in a previous paragraph, each truss subsequently erected was held by the derricks until sufficient struts and bracing had been placed to insure stability.

The gin poles were left in place until twelve or more trusses were entirely completed and braced.



## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### A. Construction History

##### 1. Procedure & Method Utilized (continued)

Sheathing for this work was handled by separate material hoists which ran up the rake of the roof on light rails, and was delivered to movable scaffolds extending horizontally to the right and left of the hoists. The scaffolds were raised by means of scaffold winches and cables attached near the monitors.

On the ground the sheathing was sorted and placed on roller conveyors set at each side of the skip at its lowest position and roller conveyors were provided on the deck of the skips. The loads of sheathing were rolled onto the skips and delivered to the scaffold onto another set of conveyors, running the full length of the scaffold and behind the working area. The material was thus delivered to its destination with a minimum amount of handling. The same devices were used in handling the roofing material.

The monitors, catwalks, stairs to same, and the monorails were prefabricated and set by the stiff leg derricks as the truss erection progressed. Units of the bracing between trusses consisting each of a lower chord strut, a purlin and the "A" bracing between were also prefabricated and erected in units.

On account of the weather, the difficulty of securing competent help, and delays incident to the non-delivery of the treated lumber as per schedule, the erection of the trusses on the first hanger was considerably delayed. On the second hanger, however, the 81 trusses were erected, including all fill-in of the purlins and rafters, monitor, catwalks and monorail for the roof sheathing, in twenty-seven working days from 12:00 o'clock noon, July 26, to 12:00 o'clock noon, August 27, 1943.

In view of the failure during erection of a number of trusses at another station, it was thought

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### A. Construction History

##### 1. Procedure & Method Utilized (continued)

advisable to take additional precautions to prevent a similar accident here, particularly since this locality is subject to sudden and gusty winds of high velocity. It was decided, therefore, to add several bays of cross bracing as shown by drawings #373 and #374 of the Sound Construction and Engineering Company.

This method was chosen as being more economical than a system of temporary timber bracing which would have to be removed with no scaffold available to work from; or than the use of more guy lines which would have interfered with the operation of the derricks. Wire rope was also difficult to procure and would have endangered the trusses by applying concentrated loads of considerable magnitude.

When the time arrived to move from Hangar "B" to the location of Hangar "A", which was at right angles to the first hangar, the traveler with the two mounted derricks was moved as a unit to the new location. The track was laid a section at a time in front of the traveler and removed from behind the traveler by sections, thereby necessitating but a small amount of trackage.

The erection of the hangar door box girders was almost as great a problem as the erection of the timber trusses and again several methods of attacking this problem were evolved at the various lighter-than-air stations. The method used at Tillamook, was unique in that the supporting falsework, by being built sectionally, was moved from Hangar "B" to Hangar "A" with but little dismantling. Although the initial cost of attaining this end was higher than would have been the case were conventional falsework built, the overall economy effected in the construction of two hangars was considerable.

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### A. Construction History

##### 1. Procedure & Method Utilized (continued)

The concrete door pockets were completed first. Following this the girders were erected in place on falsework towers which were designed by the contractor to be movable.

Scaffolding around the door pockets, used in their construction, was made a part of the falsework which essentially consisted of five tower-like structures about 45 feet square at their bases. One tower was set under each of the cantilever ends, and the remaining three under the center span. The space between towers of the center span was bridged over at the level of the scaffold deck which was set approximately four feet below the soffit of the girder. Scaffolds were built for both girders of the first hanger and were moved and reused for the second.

Material for the girder was hoisted to the scaffolds by the stiff leg derricks when convenient. When the derricks were occupied elsewhere, material skip hoists were provided on the scaffold.

Erection of the girders was begun by setting the inside steel corner angles and bottom planking to the proper camber on blocks built up from the scaffold deck with house jacks under the angles. This was followed by the placement of the diaphragm frames, the side and top planking and finally the outer angles. Members were temporarily secured until all were in place and were then permanently bolted.

The connection between the planking and the steel angles was made by means of shear plates. The design called for  $3/4"$  bolts in shear plates which had  $1\ 3/16"$  holes. It was feared that due to shrinkage of the lumber the bolts would become sufficiently loose to allow slip-

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### A. Construction History

##### 1. Procedure & Method Utilized (continued)

page in the joint with a possible increased deflection at some later date. With the small clearance allowed between the girder and the top of the door it was thought advisable to take some precautions to lessen this possibility. It was therefore decided to ream in place to 7/8" all holes through the angles on the sides of the girders and to use 7/8" bolts instead of the 3/4" called for.

Openings through the concrete door pockets were left to accommodate the continuous steel angles and plates which occur at the corners of the girders. After the girders had been completely erected, bolted up and set at the proper camber, but before lowering the jacks, these angles and plates were concreted in place, using Hy-Trim Cement.

This procedure saved considerable trouble particularly on the first hangar where, because of the eccentric load on the footings, the pockets settled unevenly and all four leaned an average of between 2 and 3 inches out of plumb toward the center line of the hangar.

The initial camber was set at 3", the deflection at the center after the jacks were removed averaged 1 1/4", leaving a final camber of 1 3/4", which may decrease in time, but which at present improves the appearance of the structure and presents no problem with respect to the top guide rollers.

Because of anticipated settlement of the door pockets, the height of the girder from the hangar floor level was increased 1". Reference is made to this under the discussion of Soil Conditions.



## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### A. Construction History

##### 2. Utilities Required for Construction

Water for construction purposes was first obtained by a temporary 2" connection to the 4" Long Prairie Water District line which skirts the south edge of the property. This connection served not only construction forces but also the temporary office, the administration buildings, officers' quarters and mess area and the construction camp. Later a permanent water connection was made to the main supply pipe lines of the Tillamook City water system which lines pass through the reservation.

Electricity for construction power and lighting was obtained from a temporary extension to a 3 phase 11500 volt line from Tillamook with which the Mountain States Power Co. served farmers, etc., in the vicinity of Tillamook.

Sanitary sewerage was taken care of in the temporary office in the South Prairie School House by the building's own system. By the time the office was moved to its permanent location, the permanent sanitary sewers had been built and a connection was made to that system.

Communications were maintained by telephone through PBX boards with six outside lines and thirty six extensions, by telegraph, by a Western Union Telegraph Co. Simplex Printer T 2-B and by teletype by A T&T Teletypewriter Service.



## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### A. Construction History

##### 3. Construction Facilities

###### a. Equipment, general discussion of

###### (1) Construction

Construction equipment consisted of both contractor owned equipment under lease to the Navy and Navy owned equipment. In addition thereto the subcontractors, both lump sum and C.P.F.P., furnished such equipment as was required by the terms and provisions of their subcontracts.

In general the construction equipment included derricks and crawler cranes for the assembly and erection of the hanger framework; earth moving equipment such as dumptrucks, bull dozers, scrapers, tractors, power shovel, etc.; bituminous paving equipment including asphalt hot plant, rollers, etc; lumber conveyors, lumber carriers, power saws, etc; concrete mixers, batch plant, Mixermobiles, Euggymobiles, strike-off belts, etc., for mixing, placing and finishing concrete foundations, walks, tanks and paving; air compressors and other tools for structural steel workers and mechanical trades; usual hand tools, etc.

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### A. Construction History

##### 3. Construction Facilities

###### a. Equipment, general discussion of

###### (2) Transportation

Transportation to and within the job was handled by train through a connection to the Southern Pacific Railway at Tillamook, by trucks and by cars.

It was realized at the beginning that the railroad connecting the Southern Pacific tracks in Tillamook with the N.A.S. would be of inestimable value during the construction of the station and for this reason work on the railroad was rushed. The original design entailed a great many difficulties of construction and operation. Extensive studies were made to evolve a plan which would obviate these difficulties and effect economies over the original plan. Such an altered plan was produced but failed to meet with immediate approval by officials of the railroad company. Since the rainy season was rapidly approaching, it was decided to proceed with the original plan rather than risk crippling the job by tying up transportation during the wet season while discussing changes with the railroad company.

Men and materials were transported within the reservation by means of trucks, pick-ups and passenger cars.

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### A. Construction History

#### 3. Construction Facilities

##### b. Plant Set-up

The plant set-up consisted of a number of units chief among which were:

(1) Temporary Office Building. This building was built to house the entire office force of the contractor including administrative, accounting, engineering, procurement departments and subcontractors; the Navy including the office of Officer-in-Charge of Construction, auditing, engineering and inspection departments; Architect-Engineers; general conference rooms. This joint use of office facilities resulted in a close cooperation between all divisions and saved much time in holding necessary conferences and conducting inter-office business.

(2) Motor Pool complete with blacksmith and welding shop for the repair and servicing of both light and heavy equipment.

(3) Lumber Yard for the storage of lumber and other materials which could be safely stored while exposed to the weather.

(4) Warehouses for the storage of miscellaneous building materials, tools, equipment and apparatus.

(5) Carpenter Shop, for the prefabrication and sub assembly of millwork, hangar catwalks, monitors, etc.

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### A. Construction History

#### 3. Construction Facilities

##### b. Plant Set-up (continued)

(6) Infirmary (described in full under III-G-Safety)

(7) Time shacks

(8) Superintendents' Offices in various areas

(9) Subcontractors' Warehouses

(10) Erection Traveler carrying derricks for erecting hanger framework (described in full under III-A-1 Procedure and Method Utilized)

(11) Concrete Batching Plant. This plant was located on the railroad spur and near the cement warehouse and was used for dry batching the concrete materials for the whole job before delivery to the various mixers by dump truck.

(12) Hot Asphalt Plant. This plant was located on the railroad spur and was used for preparing the materials for surfacing the landing mats, mooring circles, runways and various other areas surfaced with asphaltic concrete.

(13) Assembly Yard for Wood Trusses. This plant was located near the hangars and was equipped with jigs for assembling the hanger trusses, crawler cranes for moving and loading the sub assemblies and lumber carriers for bringing up the truss members to the assembly jigs.

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### A. Construction History

##### 4. Construction Materials

###### a. Inspection of

The Navy set up a testing laboratory on the job and tested building materials such as concrete aggregates, cement, road gravel, asphalt and road oils.

Tests on asphalt, road oils, roofing and roofing asphalt were supplemented by further tests at Charlton Laboratories, Portland, Oregon, and Laucks Laboratories, Seattle, Washington.

Compression tests were made on specimens of fire treated timber by Charlton Laboratories and by Oregon State College.

Mill test reports were accepted for reinforcing bars.

Concrete compression test cylinders were made by the Navy for every 100 cubic yard poured or at least one for every new unit. These compression cylinders were tested by the Navy or by Charlton Laboratories and resulting compression tests averaged in excess of 3500 lbs per square inch for the entire job.

Extensive soil explorations and tests were made in the hangar areas by the A-E and by the Navy Inspection Department, both under the direction of the CinCC.

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### A. Construction History

##### 4. Construction Materials

###### a. Inspection of (continued)

All pipe lines including those for steam, water, air and helium were tested by the Navy to twice their working pressures.

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### A. Construction History

##### 4. Construction Materials

##### b. Control of (Concrete)

The weights of all aggregate, cement and water used in the mixing of concrete were controlled by representatives of the Navy who were on duty at the batching plant at all times when concrete was being poured. The water-cement ratio was carefully checked by slump tests.

Compression cylinders for strength tests were taken and tested as outlined in the section on Inspection of Construction Materials.

Placing of concrete was under continuous supervision of representatives of the Navy who checked the mixing, placing, vibration, finishing, etc., and the temperature of the concrete.



## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### A. Construction History

##### 4. Construction Materials

###### c. Unit Costs, Discussion of

Purchases were made generally after taking at least three bids and placing orders with the offerer of the lowest price except in rare instances where the low bidder was disqualified due to inability to make the required delivery or for other good and sufficient reasons. This procedure assured prices in line with prevailing prices in the locality.

In the case of concrete aggregate, higher than local prices were paid as this material was shipped from Portland. Extensive tests were made in an endeavor to find local aggregate which would prove satisfactory, but this effort was unsuccessful. Compression tests as low as 500 lbs per square inch were obtained. These coincided with results of earlier explorations made by other agencies in an effort to find satisfactory concrete aggregate locally.

In the earlier phases of the construction period, advance pooled buying for the entire job was not permitted as outlined in the Manual. This restriction resulted in the paying of higher prices in some instances than would have been paid otherwise.



## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### A. Construction History

##### 4. Construction Materials

##### d. Conservation of Critical Materials

###### (1) Moves to Effect Economics

In the report of the Architect-Engineer, Contract 5614, (Technical Discussion, Materials) appears an extensive discussion of steps taken to influence design to the end that a minimum of critical materials would be used.

By the use of wood gutters and down spouts the use of galvanized iron was minimized. Concrete was designed with as little reinforcing steel as possible, composition wall board was used extensively in place of plywood, etc. Steel was saved by using pre-stressed concrete underground gasoline storage tanks instead of the conventional steel tanks.

Steel was further saved by the use of wooden fence posts.

Particularly serious problems were encountered in obtaining proper electrical equipment. Here it was not only a case of trying to save or eliminate critical materials, but it also was a case of substitution because materials specified were not available.

Directives from Budocks ordered increases of allowable unit stresses above those in common use wherever any appreciable saving of critical ma-

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### A. Construction History

##### 4. Construction Materials

##### d. Conservation of Critical Materials

##### (1) Moves to Effect Economics (continued)

terials could be made by such procedure.

In the design of erection equipment tree trunks were used wherever possible in place of heavy timbers.

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### A. Construction History

##### 4. Construction Materials

##### a. Conservation of Critical Materials

###### (2) General Changes in original plans due to

Very few designed plans were furnished to the job by Budocks consequently designing was done in the field. By the time the field design was accomplished, it had become apparent which materials were critical and which were not. Consequently, it was possible to make most of the original plans conform to the request for savings in the use of critical or rare materials.

Complete plans for the hangars were furnished by Budocks. These hangars were designed with a roof framework of fire treated timber in place of steel as had been used in similar hangars previously constructed at other stations.

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### A. Construction History

##### 4. Construction Materials

##### d. Conservation of Critical Materials

##### (3) C.M.P.

The Controlled Materials Plan had very little effect on the materials used in the project as it did not become operative until most of the materials had been purchased.

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### A. Construction History

##### 5. Organization of the work

The job organization consisted of four major departments operating under the project manager. These departments were Accounting, Engineering & Procurement, General Construction and Personnel. Each department was under a chief who in turn transmitted his authority down through various assistants, foremen, etc.

An organization chart is appended which shows the various lines of authority and also shows the distribution of work and those responsible for the production thereof.

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### A. Construction History

##### 6. Construction Operations

It was apparent from the beginning of construction that construction operations of as many kinds as possible proceed simultaneously, and to this end, great care was exercised so that the proper materials should arrive at a designated place at the right time; that construction roads be open and free from traffic jams; that mechanics for each successive operation be available; and that they start work immediately upon completion of prerequisite work.

All of the above were matters of policy but were as important to the progress of the construction project as were the actual physical processes of earth moving, concrete pouring or truss erection.

The more important operations in the contract, whether on account of size, difficulty of execution, or expenditure of funds involved, were the railroad construction, grading, hangar construction; utilities; pavement; and helium storage, distribution and repurification. These features were given the maximum of study and consideration.

At the start of construction of the Station it became apparent that the railroad connection from the end of the Southern Pacific tracks in Tillamook to the site of construction would be a big benefit to the contractor because of the large amount of freight traffic anticipated.

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### A. Construction History

##### B. Construction Operations (continued)

The Architect-Engineer started to work on this at once and submitted a location and profile to the Officer-in-Charge about the latter part of August.

The contractors' engineers inspected the site to prepare for construction of the railroad and noted several construction and operation difficulties, that might be avoided by a change of locations as follows:

1. The road traversed about 3000 feet of swampy bottom land. Tests showed 3 to 4 feet of silt and peat covered with a mat of grass resting on a maximum of 18 feet of clayey sand, having no bearing value whatever. After removal of part of the top layer a 2" x 4" timber 14' long was pushed full length into this material by hand.

2. The area was frequently covered with water during the winter to a point very near the top of the ties. The South easterly course of the road presented the grade broadside to a heavy surf because of a prevailing southwest wind.

3. Several large water courses required pile trestles.

The contractors' representatives proposed a new location, beginning at the end of the present Y track of the Southern Pacific Railway, running east along higher ground, and turning south to the Station, requiring about 2500 feet more trackage but eliminating most of the other difficulties

Meanwhile negotiations had been continued on the original location with Budocks and the Southern Pacific Railroad with subsequent approval by both parties.



## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### A. Construction History

##### 6. Construction Operations (continued)

The matter of a new location was taken up with the Southern Pacific Railroad by the Officer-in-Charge and they refused to grant permission for a change on the grounds that it would make some difference in their operation of the yard tracks.

Since the rainy season was rapidly approaching when no motive equipment could operate in that area, the Officer-in-Charge of Construction decided to proceed with construction on the original location rather than consume valuable time negotiating with the S. P. Railroad.

Accordingly construction was begun at once, about the first week in September of 1942. The problem of supporting a 10' fill, on or through the area and movement of piledriving equipment to drive piling for trestles presented a knotty problem for the contractor. The method of building the fill was discussed with Mr. Hampton and Mr. Hazelton of the S. P. Railroad, various logging road contractors, and local engineers. The plan suggested by Mr. Hampton was adopted, and it was decided to place the fill directly on the grass. His theory was that the grass and peat would serve as a mat and confine the soft clayey sand under the fill and that after the initial settlement very little more movement would occur. Riprapping the fill was proposed by the contractors' representatives but it was deemed unnecessary by the Architect-Engineer.

The long haul and short turning radius precluded all grading equipment except trucks and shovel operation. It was decided to end dump from trucks in layers 3 or 4 feet deep and bring the fill up in this manner, getting some compaction in the fill by routing the hauling equipment over it. Run-arounds were to be built around



## CUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### A. Construction History

##### 6. Construction Operations (continued)

the trestles. As the grade approached the proper height the pile-driving equipment was to be brought up and piling driven while the trucks operated on the run-around.

Because of the distance between trestles, crawler cranes with swinging leads were to be used.

Work on the fill commenced and was put on a 20-hour basis as soon as equipment and personnel could be built up.

The peculiar composition of the soil available for borrow made equipment operation over the fill difficult even in dry weather. The material is locally called cemented gravel, and consists of a gravel sand and clay mixture that is very hard in the native state; upon digging, it breaks up into a gravelly mixture that appears to be excellent material to handle, but manipulation seems to free water held in the voids. This, combining with the clay, forms a lubricant and the more it was worked the soupiier it became. Trucks quickly sank to their axles. Stallings were frequent and difficult to handle because of the narrow grade and the absence of any stable footing in the vicinity. This condition was partly overcome by mixing part of the black top soil with the gravelly material. Due to the dry spell this top soil was dry enough to absorb some of the water and partially stabilize the fill. However, the proportion of top soil to gravel was not high enough to correct all the fill and only the worst spots could be treated.

The portion of heavy fill was completed and the pile driving rig was started by the time the fall rains commenced. As yet the gravel sub-base was not on the fill and truck operation on the grade was impossible. Material for trestle construction was hauled in with cats, resulting

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### A. Construction History

##### 6. Construction Operations (continued)

in the loss of some of the grade. Waterways were plugged up because of the run-arounds and could not be opened as it had been planned to bail them out with a clamshell and locomotive crane when the track was laid. This necessitated hand labor for this operation during the rainy weather before the track was laid.

Pile-driving equipment consisted of a crawler crane with swinging leads, and air hammer driven by two air compressors.

Seven-hundred-fifty permanent piling, 35 false-work piling, and 3 test piles were driven, mostly during rainy and wet weather. The rigs had to move on mats, all fuel equipment and material had to be hauled on mats during the wet period and then only by dint of much hard work and man hours, forcing the equipment through the mud.

Across the swampy area the length of the piling driven varied considerably even in the same bent. Underlying the soft stratum, a layer of cemented gravel was found that could not be penetrated by piling. Because of the unstable nature of the soil, considerably more driving time than ordinary was spent on the piles in an attempt to get some penetration into the cemented gravel for lateral stability.

Steel pile points were installed and with these, a penetration of 12 to 18 inches could be made without brooming the pile if carefully handled.

The next item to be given special consideration was that of clearing and grading. On the ground prior to commencement of the job was the contractor who had been employed to construct the Tillamook County Air port under the Civil Aeronautics Authority. This project was located wholly within the site acquired by the Navy for the lighter-

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### A. Construction History

##### B. Construction Operations (continued)

than-air-station. This contractor already had excavation equipment on the site and was in a position to commence work with his equipment at once. Inasmuch as it would take two or three weeks to get contractor owned equipment on the job, this time was saved by sub contracting the clearing and certain portions of the grading to the airport contractor.

It had been reported by the Army Engineers that in the construction of runways the topsoil had been found to make an unsatisfactory base and it was recommended to the A-E that all of this material beneath landing mats, runways, hangar floors, etc., be removed and gravel be used to backfill to grade. This matter would involve an expenditure of funds far in excess of those originally contemplated and, consequently, the A-E gave this recommendation serious study before acting upon it. However, with the concurrence of CINCPAC it was ordered that all top soil be removed from certain areas and gravel backfilled to bring the surface up to required grade.

The effects of this directive were far reaching. The quantity of work entailed was considerably in excess of the original estimate. Stripping was carried to depths varying from one to eight feet and backfilled with about one million cubic yards of gravel. Consequently large quantities of earth in important areas had to be moved during months of excessive rainfall. Even the heaviest and most modern excavating equipment failed to cope with the situation and became hopelessly bogged down. Time was lost and unit costs showed marked increase during this period but every attempt was made to continue operations because of the urgency to complete the project at the earliest possible date.

The next problem studied from the angle of con-

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### A. Construction History

##### 6. Construction Operations (continued)

struction operations was the building of the hangars. The foundations had not been designed as yet by Budoeks and important decisions were to be made as to whether bearing piling would be used and as to size and depth of footings. To assist in arriving at decisions on these points Budoeks requested that borings be made at the hangar sites.

The most noticeable feature of the material underlying the hangars is its lack of uniformity. Strata of stiff blue clay, yellow clay, sand and mixtures of clay and gravel occur in thicknesses from 1 to 8 feet at varying depths and with considerable variation in thickness and depth of strata between excavations only twenty feet apart.

Drill holes were sunk to a depth of 100 feet on the 1/4 points of the footing line. A representative undisturbed core sample was taken at every change of strata, samples were sealed and mailed to Budoeks accompanied by a log of each hole.

Soil bearing tests were also made at the request of the Bureau. This work began on July 27 and continued until October 1, 1942 without any comment from the Bureau.

Test pits on the four door pocket footings were sunk to a good gravel strata to ascertain the depth of footing needed for tower construction. The bearing factor of this gravel strata was determined by means of load tests applied with a gauged hydraulic Jack and deflection recorded with an Ames Dial. Maximum allowable settlement was 0.001" for a thirty minute interval. Initial loading was two tons per square foot, and increased by one ton increments to an ultimate load of 8 tons per square foot.



## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### A. Construction History

##### 6. Construction Operations (continued)

On October 15 the contractors were directed to use sheet #212827 for the construction of foundations for Hangar "B". This sheet showed only the footings under the concrete bents supporting the trusses but made no reference to the door pocket footings. Drawings for the Utility Tunnel were issued on October 27 but the information on the door pocket footings was delayed until November 14, 1942.

Information on the foundations was received during the season of heaviest rainfall and excavation was carried on during this period. It was almost impossible to move about the area on foot and quite impossible to bring in any equipment for grading or excavation. All excavations had to be pumped continuously until concrete was poured.

The foundation drawings gave the areas of the footings and minimum depths, but because of actual conditions with respect to the lack of uniformity of the material, each footing had to be redesigned to meet a suitable depth as determined by representatives of the Officer-in-Charge of Construction and the Contractors.

This procedure was followed on both hangars. In general, the footings under Hangar "B" rest on a stratum of stiff blue clay at least 5 feet thick or on a thinner stratum of gravel underlain by the same clay. The yellow clay was usually partly mixed with sand, absorbing water readily and rapidly becoming semi liquid. The blue clay, however, was excavated with difficulty because of its density and stiffness. It had a comparatively low moisture content and did not absorb moisture readily. Where gravel occurred, it was mixed with clay and formed a compact mass not easily compressible.

Conditions under Hangar "A" were somewhat similar,

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### A. Construction History

##### 6. Construction Operations (continued)

although in most cases, the footings rest on the cemented gravel stratum at least 3 feet thick which is underlaid with blue clay.

Because of the cohesive nature of the soil, some settlement was anticipated, and it was for this reason that the heights of the door girders above the hangar floors were raised 1" above the dimensions shown on the drawings.

Frequent level readings were taken on the door pocket footings and curves of settlement were plotted. These indicate that the footings reached a condition of practical stability within a few weeks after all of the loading had been applied on the footings; the maximum settlement of any of the corners of the door pocket footings on Hangar "B" was slightly less than 1" the average between  $5/8"$  and  $3/4"$ .

In the case of Hangar "B" the door pocket footings were eccentrically loaded by virtue of the location of the pylons with respect to the footings and this caused an unequal settlement. The four door pockets on Hangar "B" are uniformly out of plumb, leaning inward toward the center line of the hangar.

Charts showing the depth of footings as built and the amount of settlement of the door foundations are filed with the drawings.

The erection of the trusses and other members of the hangar roof framework provided a problem of unusual interest presenting difficulties imposed by both the magnitude of the structure and by the scarcity of erection equipment.

At stations where hangars of this type had al-

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### A. Construction History

##### 5. Construction Operations (continued)

ready been completed or were under construction the equipment used for erection of the roof framework was one of two general types. Traveling steel towers surmounted by stiff leg derricks of sufficient size to lift pre-assembled sections of the trusses were used as one type. The second type consisted of traveling timber falsework built to conform generally to the height and outline of the completed trusses, equipped with derricks to lift the truss members or pre-assembled truss sections into position.

Studies were made of both of the aforementioned types of equipment as to first cost, availability and overall cost of erection operations. It was found that steel towers already fabricated or steel for fabricating towers were impossible to obtain. Prices on timber falsework seemed to be unreasonably high. In the search for equipment two stiff leg derricks were found that had sufficient capacity to erect the framework and the booms of which could be lengthened sufficiently to do this when the derricks were on the ground. This procedure entailed the use of derrick booms considerably longer than any used heretofore but a careful study indicated that the work could be done by these derricks when built into a traveler just off the ground, that the investment in equipment would be less than if any other suitable type of equipment were used, that few critical materials would be required and that costs of erection would be comparable with those which had been obtained with other types of equipment elsewhere. It was also noted that in case of severe winds, which could be expected at this location and which did occur, the booms could be let down leaving little of the equipment exposed to the action of the wind.

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### A. Construction History

##### 6. Construction Operations (continued)

A detailed discussion of the procedure of erecting the hangar roof framework occurs in section III-A-1, (Procedure & Method Utilized).

On account of the great vertical distance between the derrick operators, superintendent, and raising and connecting crews, all were connected by telephone head sets so that signals and instructions could be easily transmitted. This feature was found to be invaluable when the ground or the top of the truss or both were enveloped in fog which obscured the various members of the crew from each other. Otherwise operations would have been suspended during the presence of fog.



Project Number	Date- Preliminary Draws Rec'd.	Date- Final Drawings Rec'd	Date Work Started
P1-Railroad	8-31-42	9-3-42	9-1-42
P2-Clearing & Grading	8-7-42	12-1-42	7-12-42 8-5-42
P3-Hangar A	7-21-42 10-15-42	6-15-43	8-4-43
P4-Mooring Masts	11-25-42	11-26-42	11-30-42
P5-Helium Storage	7-23-42	10-3-42	11-5-42
P6-Barracks 3 Bldgs.	8-4-42	8-19-42	A-8-10-42 B-8-11-42 C-8-11-42
P7-Men's Mess	9-22-42	10-8-42	10-5-42
P8-Cold Stor.	9-22-42	12-17-42	11-10-42
P9-Jr.-Sr. BOQ	9-22-42	10-30-42	1-3-26-42 2-3-27-42 3- 9-2-42
P9-Officers' Mess	9-22-42	10-30-42	10-23-42
P10-Com. Officers' Residences	11-21-42	3-6-43	1- 3-8-43 2- 3-8-43
P11-Recreation	9-22-42	1-19-43	1-6-43
P12-Adminis- tration Bldg.	7-21-42	11-26-42	7-23-42
P13-Radio Trans.	6-30-43	6-30-43	7-6-43
P14-Dispensary	12-17-42	2-16-43	1-5-43
P15-Sta. Maint.	9-29-42	9-29-42	10-9-42
P16-Steam Pl.	2-18-43	4-23-43	3-20-43

Project Number	Date- Preliminary Drugs Rec'd.	Date- Final Drugs. Rec'd.	Date Work Started
P17-Fire Sta. Garage	7-6-42 9-29-42	10-8-42	10-8-42 10-8-42
P18-Laundry	9-30-42	11-30-42	12-17-42
P19-Gate House Fence	7-6-42	9-5-42	9-10-42
P20-Storehouse	8-4-42	8-29-42	8-19-42
P21-Paint & Lube Oil Storage	7-6-42	7-6-42	10-8-42
P22-Gasoline Storage	7-6-42	4-9-43	9-1-42
P23-Fuel Stor.	6-19-43	6-19-43	7-1-43
P24-Utilities:			
Water	9-26-42	7-26-43	9-28-42
Storm S.	9-29-42	2-22-43	9-27-42
San.S.	10-10-42	2-22-43	8-8-42
Helium	1-22-43	2-27-43	4-9-43
Steam	12-21-42	5-13-43	3-2-43
Power Line	11-28-42	7-15-43	8-8-42
P25-Sewage Disposal - <u>Not Built.</u>			
P26-Roads, Walks, Paving	8-26-42	8-5-43	8-30-42
P27-Ammunition Sto.	8-11-42	8-11-42	<u>#1 Mag.</u> <u>10-23-42</u> <u>#2 Mag.</u> <u>2-1-43</u> <u>#3 Mag.</u> <u>3-1-43</u> <u>Inert S.</u> <u>1-3-43</u> <u>Small A.</u> <u>12-7-42</u> <u>Pyro M.</u> <u>12-7-42</u> <u>Fuse &amp; D.</u> <u>1-2-43</u>
P28-Dope Storage	2-10-43	2-10-43	2-12-43

Project Number	Date- Preliminary Drwgs. Rec'd.	Date- Final Drwgs Rec'd.	Date Work Started
P29-Pigeon Loft	5-11-42	6-11-42	3-3-43
P30-Incinerator	7-3-42	8-22-42	11-21-43
P31-Hangar B.	7-21-42	11-14-42	10-27-42
P31-40- Control Tower	4-2-43	4-2-43	4-25-43
P39-Bowling Alley			5-15-43
P48-Helium Repurific.	2-29-42	5-6-43	5-12-43
P49-Brig	12-29-42	1-6-43	1-5-43
P51-Sto. Garage	5-31-43	5-31-43	6-12-43
P52-Housing	3-20-43	3-26-43	4-7-43

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### A. Construction History

##### 7. Progress

##### a. General Remarks

In view of the handicaps to the progress of the project, which will be discussed in subsequent paragraphs, it can be considered that general progress was above average.

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### A. Construction History

##### 7. Progress

##### b. Conditions Affecting

##### (1) Weather

In a locality where the normal annual rainfall is ninety five inches, any stoppages, difficulties or high costs due to wet weather cannot be ordinarily dismissed as unexpected and should be planned for in advance. Normally thirty per cent of the annual rainfall occurs in the months of November and December. For these two months the recorded rainfall was thirty-five per cent above normal. The lack of information, the unexpected volume of work, and the critical nature of the project made it impossible to complete the work before these two months, and as a consequence the weather can be held accountable for a lack of satisfactory progress.

Due the lack of plans it was impossible to do much in the nature of earth moving until November of 1942 and the decision at that time to strip all of the top soil from certain areas before any work on the projects located in those areas could be performed resulted in a huge amount of work to be done during the winter months. During the months of November and December, 1942, there fell a total of thirty eight inches of rain and in spite of employment being raised and held to new peak volume it was impossible to approach normal schedules of production.

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### A. Construction History

##### 7. Progress

##### b. Conditions Affecting

##### (1). Weather (continued)

Huge modern earth moving machinery was bogged down repeatedly. Earth had to be handled as often as three or four times to get it to its final location and frequently it had to be handled as a liquid. All footing excavation had to be pumped continuously until concrete was poured.

During the erection of the roof framework of Hangar "B", work was stopped or impeded for about a week by high winds.

There is no question about the weather having an untoward effect upon the progress of construction.

Climatological data is appended for 1942 and 1943.

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### A. Construction History

##### 7. Progress

##### b. Conditions Affecting

##### (2). Labor

Several phases of the labor situation effected the progress of the job. During the winter months absenteeism was serious, running as high as 20% at times and upsetting all planning as to the size and effectiveness of various crews.

The quality of labor was below average due to ineptness and lack of experience, to the hiring of boys in the age bracket of 16 - 18 years, and to the hiring of female laborers. The high labor turnover and the lack of availability of sufficient labor definitely handicapped progress. This condition existed throughout the course of the contract.

The effect of labor conditions on the progress of construction is treated fully in the section on Labor Relations in Administration Discussion.

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### A. Construction History

##### 7. Progress

##### b. Conditions Affecting

##### (3) Material Deliveries

Generally after a source of supply for a material was once located deliveries were suitable. There was a week delay in the erection of Hangar "B" roof framework, due to the failure of fabricated truss timbers to arrive at the rate promised. The start of erection of Hangar "A" arched trusses was held up for about three weeks while the supply of timbers was built up and a new source of timber fire treating was developed. Other delays due to failure of materials to arrive were not serious.



## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### A. Construction History

##### 7. Progress

##### B. Conditions Affecting

##### (4) Availability of Equipment

No delay was occasioned by the lack of availability of equipment. Another contractor had equipment on the site prior to the start of construction and he was pressed into service as a sub contractor. The prime contractor moved in a large amount of his own equipment and the Navy provided other equipment upon request.

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### A. Construction History

##### 7. Progress

##### b. Conditions Affecting

##### (5) Construction Methods

Progress was kept at the highest possible level by the use of modern construction methods. This is evidenced in one instance by the record made by erecting the arched trusses on Hanger "A" in twenty-seven working days.

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### A. Construction History

##### 7. Progress

##### b. Conditions Affecting

##### (6) Availability of Plans

Progress on the project was hampered, as evidenced by the following history because of the lack of plans and information in the earlier phases of the construction period.

A skeleton organization of the contractors' forces arrived in Tillamook, on July 6, 1942. At that time there was no information as to the scope of the work to be done beyond a list of the projects as embodied in the contract and a small scale plot plan of the Base which was shortly after revised.

Within a few days, Vandykes of a number of typical buildings that had been erected elsewhere were received from the Bureau of Yards & Docks and on July 18th the first few drawings of the Hangars were made available.

Certain of the projects were to be built from standard Navy designs modified by the Architect-Engineer to suit local conditions; three were to be of Navy design requiring no modification and the remainder were to be completely designed by the Architect-Engineer. This schedule was followed to some extent but it developed later that the Engineering Department of the contractors' organization was required to take over,

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### A. Construction History

##### 7. Progress

##### b. Conditions Affecting

##### (8) Availability of Plans (continued)

complete or to redesign certain of the projects which had not been started or were not complete when the contract with the Architect-Engineer was terminated on March 1st, 1943.

On July 8th, 1942, a subcontract was let for clearing the site and on or about that date the Architect-Engineer arrived. Due to the late start of this organization, there was not much accomplished during the remainder of the month.

The contractors endeavored during this period to get as much as possible of the required material on order. Quantities were taken off of the drawings for typical buildings and material was ordered which did not always fit the situation when the final drawings were issued.

The original plan contemplated the use of the permanent Administration building, in a partly-finished condition, as an office building for the construction personnel of the Navy and Contractors. The South Prairie Schoolhouse on the south side of the property was to be used temporarily until other quarters were made available.

Because of lack of information as to its design, it became evident on July 22 that the Administration Building could not be built in time to vacate the schoolhouse before the opening date of the fall term of school. It was therefore decided on that date to build an office building for the construction forces. Sketches by the contractor were completed on July 24, the working drawings on July 27, material was ordered

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### A. Construction History

##### 7. Progress

##### b. Conditions Affecting

##### (c) Availability of Plans (continued)

and the building was occupied on August 22, 1942.

The contractors at this time were making every effort to get building excavations and as much underground work as possible complete before the impending rainy season, but there was little information available and not much progress made.

Buildings were staked out by the Architect-Engineer from incomplete plans which in some cases were changed after the forms were built.

By September, five of the permanent buildings had been started, the sewer from the Administration Building to the outfall had been laid and reasonably complete drawings for the hangars (excepting the foundations) had been received.

Later, delays were experienced in getting information on the Central Heating Plant; Piping and Pumps in connection with Gasoline Storage; foundations for the hangars; general grading plans and the Radio Transmission Building. The latter was started in one location and after a road, power line, foundations and part of the superstructure had been built, the building was redesigned and built in another location several miles away. This change in location was requested by The Ordnance Department when it was discovered that the previously approved location did not conform to safety requirements with reference to high explosive magazines.

The following is a tabulation of the dates upon which, drawings and other information were re-

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### A. Construction History

##### 7. Progress

##### b. Conditions Affecting

##### (6) Availability of Plans (continued)

ceived on the various projects and the dates upon which they were started or completed. It is to be noted that on many projects where speed was essential to the progress of the entire project, work was started before final plans were available and often even before preliminary plans were finished.



## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### A. Construction History

##### 7. Progress

##### b. Conditions Affecting

##### (7) Delay in Approvals or Authorization by The Navy

In the early phases of the contract there was some delay occasioned by failure to approve foundation plans of buildings until complete building plans were developed by the Architect-Engineer.

Considerable delay was experienced in the construction of Bunker "B" because foundation plans were not forthcoming from the Bureau until a late date. This was occasioned by the necessity of making explorations to determine sub-surface soil conditions and the study of those explorations by the Bureau.

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### A. Construction History

##### 7. Progress

##### b. Conditions Affecting

##### (8) Efficiency of Contractor

The progress curves and cost records are indicative of the effect of the contractor's efficiency on the progress of the project. The efficiency was somewhat hampered by adverse weather conditions, an unfavorable labor market, delay in receiving plans, and working under pressure.



## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### A. Construction History

##### 7. Progress

##### c. Progress "S" Curves

A progress "S" curve as of the date of closing out the CFP contract is appended. This curve of the total expenditures plotted against time shows that, at all times, the progress of the job, as indicated by expenditure of funds, was ahead of the goal established by the "Fast" curve and indicates that the project was completed ahead of schedule.

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### B. Interference & Difficulties Encountered

Some difficulty was encountered in the interpretation of accounting procedure during the early part of the job. Delay was experienced in obtaining plans with which to start construction.

Shortly after commissioning of the station in December, 1942, the OinCC received many requests for revisions of facilities. These requests, which emanated from station personnel, were somewhat of a handicap to the progress of the project. Only minor revisions or additions were allowed and were restricted to those that would not affect the progress schedule.

The chief physical difficulty was imposed by the decision to strip off the top soil in certain areas. This added a great physical and financial burden to the project making it necessary to carry on operations at an accelerated rate during a period of adverse weather.

Considerable difficulty was encountered in the design of foundations for hangar footings due to the varying and unpredictable nature of the sub surface. This resulted in individual design problems for the majority of footings.

## OUTLINE OF NARRATION

### III. Technical Discussion

#### C. Major Changes & Revisions

The original project contemplated but one hangar, however, shortly after the start of the construction a second hangar with a full complement of utilities and helium facilities was authorized. This change had been expected and consequently did not materially affect construction.

However, after the site had been prepared for the second hangar, Hangar "A", orders were received from the Bureau to construct Hangar "B" only. Since considerable money had already been expended on Hangar "A", the construction program had to be revised immediately to prevent further loss of time and money. Labor was cut in accordance and the hangar site was used to stock pile gravel and crushed rock. Excavations for footings were backfilled and the general project was programmed to be completed by 1 September 1945. Approximately two months after the stop order, the OinCC was directed to proceed with construction of the second hangar. Fortunately the effects were not too serious inasmuch as the construction of the second hangar would have been delayed under the original schedule due to the inability of the timber fabricators to meet required delivery dates. The only unfavorable result was the extra expense entailed by the cessation of work on Hangar "A", moving off the site, and again clearing the site of stock-piles to move back again.

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### D. Complaints

##### 1. Inside

Inside complaints were of a minor nature, but were numerous. All complaints were made by the station personnel and were made in the form of requested changes in construction, finish of floors, walks, ceilings, etc. Location of offices in the hangars as shown on Budoeks plans did not meet with the approval of the station and considerable time and expense was spent in an effort to accede to these wishes. Construction was delayed somewhat until the CinCC was directed by the Bureau to follow plans in every detail. After this directive, complaints registered on practically every other project were ignored in like manner unless the expense was slight and would not result in undue delay.

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### D. Complaints

##### 2. Outside

Outside complaints were made by the County Road Commissioner and by the State Highway Department regarding damage to roads, between gravel pits and the station. The great amount of hauling that was required caused considerable damage and every effort was made to aid in the repair and maintenance of these roads.

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### E. Effect on Existing Facilities

There were no existing Navy facilities at the site. However, an airport had been started by the Army Engineers with C.A.A. funds. The runways of this airport were incorporated into the facilities of the Naval Air Station.

The City of Tillamook owns a water supply line traversing the reservation. This consisted of an old 18" wood pipe and a relatively new 12" steel pipe located so that they would be under the paved landing circle and laid relatively close to the surface. In order to minimize future difficulties from pipe failure the wood pipe was replaced with a new 18" steel pipe and the 12" steel pipe was relaid at a greater depth below the landing mat.

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### P. Related Work by Station Forces

Station Forces were used in finishing grading and landscaping. Black topsoil was hauled by the contractor and dumped where it could be easily spread in the vicinity of buildings. Enlisted personnel and yard labor spread the topsoil, graded, and planted grass seed.

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### G. Safety Record

At the commencement of the project the United Pacific Insurance Company's Safety Director discussed an accident prevention program with the Project Manager and Officer-in-Charge. The insurance contract provided that the Safety Engineer be furnished by the insurance carrier.

A program for accident prevention was agreed upon and the insurance company provided a Safety Engineer who devoted his full time to the supervision of this work.

The insurance company supplied the following safety literature and materials:

- (1) "Safe Worker" magazine for each worker monthly.
- (2) Safety posters and signs, 9" x 12" and 17" x 23" for display at particularly hazardous locations changed weekly.
- (3) Two out door bill-board size safety posters changed monthly and located near parking areas.
- (4) One copy of "Safety in Formanship" magazine for each foreman monthly.
- (5) One complete set of National Safety Council Safe Practice pamphlets for the Safety Engineer.

The first aid station was built by the contractor with hot and cold running water, linoleum on the floor, work table, desk, chairs, stools, typewriter, cupboards, electric lights, tele-



## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### G. Safety Recorded (continued)

phone, cot, springs, mattress, pillows, sheets and blankets, sterilizers, infra-ray lamp, two burner electric plate, oil stove, miscellaneous instruments, splint material, bandages, tape, medicants and two stretchers. Twenty-four hour ambulance service was arranged for in the town of Tillamook and later the contractor provided a panel delivery truck converted to an ambulance.

Cases requiring medical or surgical care were referred to the local doctors and hospitals in the town of Tillamook on a fee basis.

Qualified first aid personnel were kept at the first aid station during working hours.

The cost of the first aid station equipment and salaries was paid two-thirds by insurance carrier and one-third by contractor.

The principal hazards on the project were:

Fire	Inexperienced
Explosives	help
Pressure vessels	Very old and very
Adverse weather conditions	young help
Height of buildings	Women laborers
	Traffic

The following accident prevention program was followed:

Safety Captains were elected from each crew, their duty being to watch for unsafe working conditions and unsafe working practices in their respective crews. The Safety Engineer held weekly meetings with these Safety Captains for the purpose of maintaining interest and assisting them with their problems.

The foremen were required to conduct weekly safety meetings with their workmen. They were

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### G. Safety Recorded (continued)

further required to properly instruct all new employees in the safe method in which to do their work, also to point out the hazards for their job. The Safety Engineer made daily inspections of the work in progress and made his recommendations to the appropriate foreman or superintendent.

Minutes of the Safety Captains' meeting were kept and copies were given to the Officer-in-Charge, project manager, superintendents, foremen, Safety Captains and home office of the insurance carrier.

A record of accidents by worker and by foremen was maintained by the Safety Engineer.

A weekly narrative report of the Safety Engineer's activities was submitted to the Officer-in-Charge, the project manager, the superintendents and the insurance carrier.

The Safety Engineer prepared a weekly analysis of all accidents and kept a running record of the accident frequency and severity rates in order to determine accident causes, their location and type, thus enabling him to concentrate his efforts where most needed.

Several general safety meetings were called by the project manager for the purpose of emphasizing the need for keeping accidents to a minimum.

The effectiveness of the above outlined program is well demonstrated by the results shown on the attached experience report. Although the frequency rate is above average, the actual number of days lost on account of accidents as reflected by the severity rate is considerably under the average for this type of construction work.

ACCIDENT FREQUENCY AND SEVERITY RATE  
SOUND CONSTRUCTION & ENGINEERING COMPANY  
U. S. NAVY LIGHTER-THAN-AIR BASE  
TILLAMOOK, OREGON

	No. Lost Time Accidents	No. Days Lost	Man Hours	Frequency Rate	Severity Rate
<b>1942</b>					
July	4	12	26,615	150.29	.45
August	14	82	73,282	191.04	1.12
September	10	59	148,712	67.24	.40
October	19	169	214,822	88.45	.79
November	16	322	345,554	46.30	.93
December	37	1253	295,520	125.20	4.17
<b>1943</b>					
January	25	241	365,727	68.36	.66
February	18	241	314,694	57.20	.77
March	23	445	322,817	71.23	1.38
April	22	652	250,477	87.83	2.60
May	21	2281	346,837	60.55	6.53
June	33	735	343,040	96.20	2.14
July	20	184	300,954	66.46	.61
August	14	239	319,914	43.76	.75
September	11	172	182,549	60.26	.94
October	<u>2</u>	<u>12</u>	<u>72,615</u>	<u>27.54</u>	<u>.17</u>
<b>Total</b>	<b>289</b>	<b>7079</b>	<b>3,924,109</b>	<b>73.64</b>	<b>1.80</b>

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### E. Project Analysis

The most unusual and interesting feature of the construction contract was the building of the timber roof structures of the two hangars. The procedure employed at Tillameek in the construction of the hangars has been described in great detail elsewhere in this report. There have been no previous cost data available on similar work with which to compare costs. A comparison with similar structures built at this time can only be made by comparing costs to determine which methods of erection were the right ones to employ. Unofficial comparisons of time consumed in these operations as well as costs appear to be very favorable.

The effects of inclement weather both rainy and windy have been discussed at some length in other portions of this report. It is reasonable to expect that the difficulties encountered in working in weather so inordinately wet would raise costs far above those obtained under more ideal conditions, that the delays and extra precautions occasioned by extremely high winds both actual and predicted would entail the expenditure of funds beyond those required in areas more favorably situated.

Tillameek is located in one of the most critical man power areas in the country. This fact, coupled with a very acute housing shortage, created a labor problem (discussed at length in Section IV-C (Labor Relations)).

## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### H. Project Analysis (continued)

Additional housing, in order to attract more and better labor, was requested from the Bureau. A government trailer camp was erected just outside the reservation. However, this was not provided until eight months had elapsed. At about the same time, due to constant pressure to provide homes to relieve the shortage of dwelling space in Tillamook, a housing project was approved. Funds were provided by WPHA.

A letter from the Chief of Bureau of Yards and Docks under date of February 14, gave the Officer-in-Charge of Construction authority to proceed with the construction of a Low-Cost Housing Project within the city limits of Tillamook. Vandykes were received of F.P.H.A. drawings of similar projects to be used as guides in preparation of the working drawings of this project.

Materials were assembled and work in the field started on April 7. The project with all utilities, streets and equipment was completed and accepted on June 17.

A factor which increased the cost of the entire project beyond original estimates was the requirement that the top soil be removed from certain areas and backfilled with gravel.

Another factor which increased the cost was that all concrete aggregate had to be shipped in from Portland since that available locally was unfit for use.



## OUTLINE OF NARRATION

### III. TECHNICAL DISCUSSION

#### I. General Summary of Facilities Constructed

1.	Total cubeage of Buildings	77,611,000	cu. ft.
2.	" linear feet of water-front facilities	none	
3.	" area of dock facilities	none	
4.	" area of paving asphalt	510,000	sq. yd.
5.	" area armor coat (roads, taxi ways)	110,000	" "
6.	" volume of earthwork	2,873,891	cu. yd.
7.	" volume of road gravel	1,092,318	" "
8.	" lumber	10,349,500	bd. ft.
9.	" concrete	30,900	cu. yd.
10.	" brick	390	M
11.	" reinforcing steel	700	tons
12.	" plywood	203,000	sq. ft.
13.	" plasterboard	328,000	sq. ft.
14.	" asbestos board	230,500	" "
15.	" Gyplap	120,500	" "
16.	" roofing	13,500	squares

OUTLINE OF NARRATION

III. TECHNICAL DISCUSSION

I. General Summary of Facilities Constructed (continued)

17.	Total paint	7,000	gals.
18.	" water mains	36,250	lin. ft.
19.	" sanitary sewer (Vitrified)	18,090	" "
20.	" storm sewer (concrete)	18,323	" "
21.	" steam lines	7,390	" "
22.	" helium lines	4,908	" "

## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### A. Administrative Data

See "Table of Administrative Data", Part "B".  
The information contained in Part "B" was  
obtained from the following sources:

1. Records available in the Public Works  
Office at site of the project.
2. Contractor's files.



## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### B. Fiscal and Statistical Control

This control was under the Senior Civil Engineer and the Navy Auditor and from these sources, reports and charts were prepared showing progress of the work, control of expenditures, etc. From this information, the following reports and charts were compiled:

1. Public Voucher
2. Summary Cost and Progress Report
3. Project Location Maps
4. Weekly Financial Status Report
5. Contract Control Chart
6. Completion Reports

The "Manual of Accounting for Fixed Fee Contracts" was available at the start of this project. During the first few weeks of the work, some of the procedure as outlined by the "Manual" was not correctly followed, due to misinterpretation and inability of the contractor to secure personnel familiar with this outline of record keeping. However, necessary changes and corrections were made from time to time to bring the work in line as set forth by the "Manual".

## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### C. Auditing

The following records were maintained by the Navy Auditor to assure proper financial control of expenditures and commitments against allotments:

- a. Contract Expenditure Control
- b. Allotments and Expenditure Register
- c. Obligation and Commitment Summary
- d. Non-expendable Equipment Control
- e. Rental Equipment Record

OUTLINE OF NARRATION

IV. ADMINISTRATIVE DISCUSSION

C. Auditing

1. Unit Audit

Not Applicable.

## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### C. Auditing

##### 2. Centralized Audit

The Navy Auditing staff occupied offices in the same building with the Architect-Engineer and the Construction Contractor. This arrangement was very satisfactory as necessary additional information, verification of records, etc., could be secured with a minimum of time and required very little use of the telephone. All payrolls were audited before payment by the contractor. All purchases were made only on properly approved purchase orders. A "petty cash" account was allowed to be used. This was limited to a \$10.00 amount for any one expenditure, and this limit was reached but three or four times. All rental of equipment was made by Form PG513, - "Equipment Rental Agreement", and purchase order.

The "Manual of Accounting for Fixed Fee Contracts" was followed for the auditing of all payrolls, purchases, subcontracts, invoices and equipment rental schedules.

## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### D. Accounting

The Budocks Manual for Accounting, Auditing, and Control of Negotiated Cost-Plus-a-Fixed-Fee Contracts has been used as a guide since inception of the contract in accomplishing the accounting functions of the contractor. A Harmonious relationship between Contractor and Navy auditing personnel has been maintained at all times thus insuring adequate and comprehensive review of the Budocks Manual and supplementary Circular Letters of instruction thereto and assuring coordinate action in accounting methods. Strict adherence to the manual instructions was not entirely possible at the start of the work due to the inability to procure satisfactory contractor's accountants during the first three months. Interpretations and methods varied during this period until complete organization was finally effected by the contractor.

Contractor's accountants set up the various cost and general ledger accounts in exact compliance with the Manual in its various sections on Job Accounting, General Accounts, Temporary Construction Accounts, Clearing Accounts and Permanent Accounts. The Cost and fiscal accounting books were then set up. Roving Cost Clerks were provided in the field to insure proper coding to foremen's time cards and equipment reports, from which unit costs were ascertained. All reports relative to costs were obtained from the Accounting books. Accounting records were maintained on

## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### D. Accounting (continued)

expenditure basis and entered in cost accounts when bills were paid. Costs of operating all equipment, both Navy owned and rented, were handled through Clearing Accounts for each piece of equipment. Later, on advice of Bureau representatives, this was changed to group like pieces of equipment. Currently, clearing accounts were cleared and charges made to respective permanent Accounts. Cost accounts conformed with Job Classification of Accounts.

Vouchering and filing systems were set up under Manual instructions. An open purchase order file was maintained for unfilled orders. When invoices were received and Receiving and Inspection Reports were accomplished, they were matched with the covering purchase orders and checked. If everything was found to be in order, the invoice with R&I and accounts payable voucher were given to Cost Department for Coding. Cost Codes were affixed to invoice and returned to voucher clerk who completed the voucher and stapled documents in place. The originals of invoice and R&I were placed in the forepart of the file. Prior to 1 June 1943, a separate voucher register and check register were maintained resulting in a duplication in posting. On advice of Bureau representative, this was discontinued and in place of Forms FC402 and FC408, Form FC413 was put to use. Utilizing this form eliminated use of an Accounts payable account. When payments were made purchase orders were taken from the open order file and placed in numerical order in closed purchase order file.

It was the aim of the contractor to match all freight bills against purchase orders and invoices to ascertain that shipment was made as per agreements. In the majority of cases, it was possible to cross reference freight bills with P.O. numbers. Some difficulty was



## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### D. Accounting (continued)

experienced in this phase due to the impossibility of always securing prices. On truck and tractor parts, in particular, prices were not always available. In some cases, weeks elapsed before prices could be obtained and completion of the purchase order accomplished. This precluded an absolute cross reference between freight bills and P.O.'s because freight had to be paid in 72 hours. Where possible, cross reference was accomplished subsequent to payment of the freight, but in many cases, those particular freight bills were in Navy Auditor's office for reimbursement before the purchase order was routed to the accounting departments. However, the freight bill was always matched with the R&I to insure against paying transportation on non-existent orders.

After payment had been made on an invoice, that file was placed in a "reimbursement file" until the cancelled check had been received from the bank. The cancelled check, acting as proof of payment, was stapled with the invoices & R&I's it covered and entered on Transmittal Summary Form FC411. The voucher itself was placed in the numerical voucher file.

At the end of the week a summary was made of all approved transmittal summaries and a Reimbursement Request FC306 prepared. During the first few months of 1943 when incoming materials were at their peak, it was difficult to obtain a thorough check on lumber to enable payment of invoices within discount periods. Reason for this was that much of the lumber was delivered direct to treating plants about a hundred miles distant; with the personnel available it was not always possible to check materials as fast as they arrived. To eliminate delays in payment, Contractor adopted the policy of paying 90% of the invoice immediately and remaining 10% when final check was made.

## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### D. Accounting (continued)

This met with full approval of the vendors involved.

The Navy Auditor's office was always kept advised of refunds and/or credits that were due which should be credited to the Navy. Whenever a deposit was made for these items a duplicate deposit slip was obtained and turned in to the Navy Auditor. When the weekly reimbursement request was prepared, the credits were reconciled, entered on the transmittal summaries and deducted from the reimbursement request.

All transactions of accounting were entered on Journal Vouchers Form FC401 with complete explanations thereon. Entries to the General Ledger were made from detail appearing on FC 401 only. All transactions and entries in accounting suggested by the Bureau Manual were complied with.

In the earlier part of the work, several "check in" stations, where field employees checked "in" and "out" and area timekeeping was done, were in operation. This was changed, on the advice of Bureau representatives, to one central time office. Timekeeping and payroll procedures adhere to Manual instructions.

All forms used were called for in the manual, with the exception of the forms used in the operation of Contractor's Camp. The Manual did not provide forms for this phase of operation.

The procedure as outlined in the Manual was followed with reference to receiving and handling materials and equipment.

When non-expendable tools and equipment arrived on the job numbers were assigned and af-



## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### D. Accounting (continued)

fixed thereon. A property accountant in the office was responsible for this detail and a material checker in the field coordinated field activity with office routine and procedure. Periodic inventories were made and shortages or discrepancies were adjusted and reconciled. A close check was maintained of materials and equipment on hand to determine the need for same and the possibility of declaring any of it as surplus. Immediately upon determination that an item was surplus to the job, that material was earmarked and placed in a separate location in warehouse. Surplus lists were prepared on items in question and submitted to Officer-in-Charge of Construction, who furnished same to Surplus Materials Board and obtained disposition.

Handling of surplus shipments and bookkeeping procedures as outlined in Circular Letter 210-43 were followed.

The same accounting procedures as outlined in the above paragraphs apply to Fixed Fee Sub Contractors who worked under Hcy-5424.

## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### B. Purchases and Approvals

The third copy of all purchase orders, and change orders, accompanied by the original Request for Bids and Bid Comparisons, were given to the Navy Auditor for his permanent file. In some instances, the lowest bidder was not awarded the order, but in every such case an explanation would be attached explaining why a higher bidder was awarded the order. This was always due to more prompt delivery, difference in freight, etc. A change order was written where changes would be made in the original order after award, or to allow a difference of over five per cent in excess shipments.

A separate record, as well as an "open" and "closed" purchase order file was kept. The purpose of this record was to show the amount of filled and unfilled orders at any time.

Before an invoice was approved for payment, a Receiving and Inspection report, together with any other necessary papers, properly signed by a contractor representative as well as a Navy inspector, showing in detail the items covered, was presented with the request for payment. In order that the files would be complete on completion of the contract, the "unfilled" part of all purchase orders was canceled by a change order.

In general, all provisions of the Manual and Circular Letters relative to competitive bids,

OUTLINE OF NARRATION

IV. ADMINISTRATIVE DISCUSSION

E. Purchases and Approvals (continued)

distribution and preparation of purchase orders, the receipt and inspection of materials, invoice audit, etc., were adhered to.

## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### F. Insurance Experience

The firm of Dawson & Field, Seattle, Washington, was retained by the contractor to act in the capacity of insurance advisor. A statement of financial responsibility along with insurance service agreement was forwarded to L. P. Beck, Chief, Insurance Division, Navy Dept., Washington, D. C., and the agreement was subsequently approved. The insurance advisor then procured the policies which in his estimation, and with contractor and Navy approval, satisfactorily covered this activity. Policy No. CLP-5885, a comprehensive liability and property damage coverage with \$50,000/\$100,000 limits; Policy EML-15184, a workmen's compensation and employer's liability insurance; Policy DDDP-1057 a commercial blanket bond, were found applicable to the contract. The Insurance Division, U. S. Navy was notified that the United Pacific Insurance Company, Seattle, Wash., had been designated as acting insurance carrier. The insurance carrier agreed to place a full time safety engineer, maintain first aid station with two qualified men in attendance and arrangements were made for ambulance service. The insurance company has been billed for two-thirds of the cost of all labor for the first aid station and a credit to the Navy has been made by deduction from contractor's reimbursement request. It was desired to have the workmen's compensation and employer's liability, as well as the comprehensive liability and automobile property damage insurance written on an average rate rather than on a specific rate, and the insurance company

OUTLINE OF NARRATION

IV. ADMINISTRATIVE DISCUSSION

F. Insurance Experience (continued)

was prevailed upon to promulgate an average rate.

## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### 7. Insurance Experience (continued)

##### 1. Cost Data and Loss Ratio

The total charge for compensation and liability insurance by the United Pacific Insurance Co. was \$418,032.63. If the contractor had been on a lump-sum basis, the foregoing standard insurance premium would have applied. On the Navy department rating plan, the insurance company may collect as a maximum premium 90% of the standard premium which, as presented by the insurance company, amounts to \$378,374.08. Under the rating plan, however, the insurance company is not permitted to retain the difference between the 90% and the total losses paid. The insurance company may charge only a fixed fee, which, in this case amounted to 6.8% and figured on the 90% premium totals \$25,729.43. Compensation losses are not paid without considerable delay. On losses that have not been closed the insurance company is required to set up a cost estimate of loss. This estimate plus the amount for losses actually paid total \$178,777.97. A figure of 12% of the incurred losses allowed for handling claims is added to the aforementioned figure which is then called modified loss and in this instance equals \$200,231.33. An additional cost covering expert testimony is added, in this instance amounting to \$252.65. In other words, the insurance company may retain the following out of the 90% premium:

Fixed Charge	\$25,729.43
Modified Losses	200,231.33
Allocated Claims	
Expense	252.65
Total	\$226,213.41

OUTLINE OF NARRATION

IV. ADMINISTRATIVE DISCUSSION

F. Insurance Experience (continued)

1. Cost Data and Loss Ratio (continued)

A tax item is then allowed which brings the total premium that the insurance company may collect to \$232,719.72. The standard insurance premium of \$419,032.63 is thereby reduced to \$232,719.72 or a saving to the government under the rating plan of \$185,312.91.

Compensation losses may run for a long period of time and cannot be adjusted and paid without considerable delay. An estimate of losses not closed has been set up by the insurance company. This estimated cost plus the losses which have been actually paid total \$178,777.97 and are regarded as incurred losses. The loss ratio, however, cannot be accurately determined until all cases are closed. A breakdown of losses incurred, including estimated open and paid closed cases is given herewith:

	<u>Number of Claims</u>	<u>Compensation or Liability</u>	<u>Medical</u>	<u>Total Losses</u>
Workmen's Compensation	1529	\$ 120,725.76	43,326.88	164,052.64
Automobile	33	4,725.33	-0-	4,725.33
General Liability	2	10,000.00	-0-	10,000.00
	1564	135,451.09	43,326.88	178,777.97

## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### F. Insurance Experience (continued)

##### 2. Comparison of Standard Insurance and Comprehensive Rating Plan

In the discussion of insurance cost and explanation of the amount of gross premium for collection by the insurance company, it was shown that the standard insurance would aggregate \$418,032.63. The comprehensive rating plan used in connection with this activity allowed a gross premium of \$232,719.72. In comparison with the Oregon State Fund, a saving to the government is likewise indicated. Due to the contract being on a CPFF basis it was the contention of the insurance advisor that the insurance should be placed on the comprehensive rating plan and that a saving would result over placement of the insurance with the State plan which would be written on a lump-sum basis. An indication of rate differences is noted herewith by enumeration of a few classifications:

	<u>United Pacific</u>	<u>State Fund</u>
Carpentry	8.913	7.00
Road Paving	4.653	6.00
Grading of Land	8.877	6.00
Concrete Construction	7.961	7.00
Door Girder Erection	30.214	20.10
Flooring and Foundation	7.961	7.00

Taking into consideration all adjustments under the rating plan, the gross premium totals \$232,719.72 or approximately 50% of the standard



## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### F. Insurance Experience (continued)

##### 2. Comparison of Standard Insurance and Comprehensive Rating Plan (continued)

premium, thus the United Pacific rates listed above would be in the final analysis reduced about half. Assuming an average difference in rates of 30% the state premium would run approximately \$300,000.00. The approximate saving to the government could therefore be established roughly as \$67,000.00. At the inception of the contract it was not possible to procure an experience rating from the State as contributions for one full year are required before the employer is entitled to this rating. The insurance advisor states that although the rates charged by the State Fund range from 20% to 30% less than the rates charged by the National Council the insurance, if placed with the State, would have been written on a lump-sum basis and therefore the saving to the government by reason of placing this activity under the comprehensive plan would not have been possible.

## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### G. Labor Relations

##### 1. Union Regulations and Agreements

The nature of the project made it necessary for the contractors to operate a union job. At the start of the project, the contractors found it necessary to employ a few laborers who had not cleared through the laborers' union since the nearest union hall was at Astoria, Oregon, 76 miles from Tillamook,

About July 10th, the Oregon State Building and Construction Trades Council established a union hall at Tillamook and all workers who came within the jurisdiction of this group were obliged to present a clearance from their respective unions before being employed on the project.

Due to some difference of opinion between union officials, the local unit of the International Hodcarriers, Building and General Laborers' Union of America withdrew from the Oregon Building and Construction Trades Council's office and established their own office in Tillamook. Both the carpenters' union and the painters' union did likewise.

The electrical workers also withdrew from the local Oregon Building and Construction Trades Council's office and after withdrawal, all members of this organization were cleared through the Salem, Oregon local. This clearance was effected by telephone through the Tillamook office of the United States Employment Service.

The Hoisting and Portable Engineers, Local 701 of

## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### G. Labor Relations

##### 1. Union Regulations and Agreements (continued)

Portland, Oregon assumed jurisdiction over those workers employed in the heavy construction division. Union clearance was effected by telephone by the local office of the United States Employment Service.

The agreement covering workers coming under the jurisdiction of the Oregon State Building and Construction Trades was signed August 15, 1942 with several amendments added November 22, 1942.

The agreement with the Hoisting and Portable Engineers was signed November 21, 1942. However, the contractors were observing union conditions prior to the signing of the agreements.

Cooks, waiters, kitchen help, and others employed in and around the mess hall who ordinarily would come under the jurisdiction of the Hotel & Restaurant Employees, International Alliance and Bar Tenders League of America were not covered by a signed agreement. However, the workers belonged to this union or worked on a permit.

In the first part of 1943, Mr. B. O. Lum, business representative of the Portland chapter of the Association of Technical Engineers and Architects stated that their organization had signed up all workers coming under their jurisdiction 100%. These workers were those engaged in civil engineering, drafting, etc. They did not request a signed agreement with the contractor. (Note--see (d) Wage adjustments).

## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### C. Labor Relations

##### 1. Union Regulations and Agreements (continued)

##### a. Conduct of Labor Delegates and Observations of Exclusion Policy

Labor delegations were uniformly orderly, courteous, and businesslike in their contacts with the contractors and the Navy. The exclusion policy was observed and no union official was permitted on the project unless requested to do so by the contractors. It was advisable at times to take union officials onto the project to make and arrive at a proper determination of job classification or to adjust some difference of opinion of workers, i.e. - W. T. Matthews, special deputy of bricklayers' union, was requested to come on the project in order to help solve the problem of bricklayers who were requesting \$1.75 per hour when the predetermined wage scale on this project for this class of work was \$1.625 per hour. The rate of \$1.75 an hour was being paid at Astoria, Oregon, and some of the masons thought the same rate should apply here inasmuch as this job was under the jurisdiction of the Astoria local.

Mr. Matthews interviewed masons on the job and explained to them the union obligations. The matter was settled from that point on.

i.e. Representatives of the ironworkers union, carpenters' union, and piledrivermen's union were invited to the project site to help clear up the question of union jurisdiction over cer-

## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### 3. Labor Relations

##### 1. Union Regulations and Agreements (continued)

##### a. Conduct of Labor Delegates and Observations of Exclusion Policy (continued)

tain phases of hangar construction. The following verbal agreement was made:

"Carpenters' union would have control over:

1. All work on door pocket scaffolding and concrete forms @ \$1.35 per hour.
2. Stairs and monitors made in the carpenter shop @ \$1.35 per hour.
3. All work up to the top of the "A" frames @ \$1.35 per hour.

Piledrivers' union would have jurisdiction over the following portions of the hangar construction:

1. The work in connection with truss assembly and erection of job site @ \$1.49 per hour.
2. The erection of the material hoisting towers @ \$1.49 per hour.
3. All work above the "A" frames, including the erection of the door box girders and scaffolding for same @ \$1.49 per hour."

It was further agreed among the union officials that carpenters, piledrivermen, and ironworkers could work at each other's trade on the construction of the hangar without being obliged to join the representative union. This proved definitely advantageous to project operations.

## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### C. Labor Relations

##### 1. Union Regulations and Agreements (continued)

##### b. Employment of Stewards

Stewards were used on the job by the painters, laborers, carpenters, and several other union groups. At no time were the job stewards overly active. Occasionally, a steward would be inclined to cover too much territory, but this practice was stopped by calling it to the attention of his union. The Hoisting and Portable engineers did not maintain a steward on the job.

## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### G. Labor Relations

##### 1. Union Regulations and Agreements (continued)

###### c. Use of referral card system

United States Employment Service cards were put into use with the first hiring on the job. All workers were obliged to clear through the Tillamook office of the United States Employment Service prior to being hired by contractors. The referral cards were presented to the contractors' employment office, proper notations were made on the cards as to the disposition of worker, and the cards were then returned to the United States Employment Service office.

The United States Employment Service proved very helpful and cooperative in locating and recruiting workers, and was of inestimable value in the entire construction program.



## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### G. Labor Relations

##### 1. Union Regulations and Agreements (continued)

###### d. Wage Adjustments:

The predetermined wage schedule for all hourly employees was established July, 1942. Subsequent to that time, numerous changes have been made in the wage rates. There have been changes with the established rates and additional classifications and rates added.

The first adjustment was approved September 10, 1942, wherein heavy construction laborers and building laborers' wages were equalized at \$.95 per hour. Prior to that time, heavy construction laborers were being paid \$.825 per hour and the building laborers were being paid \$.95 per hour.

All adjustments or additional classifications and rates for hourly workers had the approval of the Bureau of Yards & Docks before being placed in effect. Those new classifications or adjustments that were made subsequent to October 3, 1942, were made in compliance to Executive Order #9250.

A schedule of the latest wage rates in effect is appended.

The original predetermined rates plus any adjustments and additional classifications and rates approved subsequent to July 27, 1942, are shown on this schedule.



PREDETERMINED RATE, PLUS ADDITIONAL CLASSIFICATIONS  
APPROVED BY THE OFFICER-IN-CHARGE FOR THE LIGHTER  
THAN-AIR-BASE (NAS), TILLAMOOK, OREGON IN EFFECT AS OF  
June 1, 1943

<u>BUILDING CONSTRUCTION</u>	<u>PER HOUR</u>
Air Tool Operator (Jackhammerman, Vibrator)	.95
Asbestos Workers	1.50
Asbestos Workers (Improvers)	
1st Year	.70
2nd "	.80
3rd "	1.00
4th "	1.00
Blacksmiths	1.00
Blacksmiths Helpers	.80
Boilermakers	1.65
Boilermakers Helpers	1.40
Bricklayers	1.625
Carpenters, Journeyman	1.35
"    Apprentice rates (Approved Sept. 4, 1942 Bureau of Yards & Docks 40% of Journeymans Scale	
1st 6 months	40% of " "
2nd 6 months	45% of " "
3rd 6 months	50% of " "
4th 6 months	55% of " "
5th 6 months	60% of " "
6th 6 months	65% of " "
7th 6 months	75% of " "
8th 6 months	85% of " "
Cement Finishers	1.35
Electricians	1.50
"    Helpers	1.12½
Fireman	1.07
Oilers	1.01
Glaziers	1.375
Iron Workers, Structural	1.65
"    "    Ornamental	1.65
"    "    Reinforcing	1.35
Laborers, Building	.95
Lathers, Metal	1.625
"    Wood	1.50
Marble Setters	1.375
"    "    Helpers	.95
Mason Tenders	1.20
Mortar Mixers	1.20
Painters, Brush	1.32
Painters, Spray	1.50
Painters, Bridge (Structural steel & bridge--towers over 100 ft. that is extra hazard- ous)	1.445

**BUILDING CONSTRUCTION (continued)****PER HOUR**

Piledrivermen	1.49
Pipe Layers (Concrete and Clay)	1.00
Plasterers	1.60
Plasterers Tenders	1.20
Plumbers	1.625
Plumbers, Helpers	.95

**POWER EQUIPMENT OPERATORS**

Air Compressors	1.41
"Cats", all attachments	1.35
Cranes, Derricks, Booms	1.49
Hoists, Building	1.58
Hoist and Mixer Combination	1.86
Pumps, Concrete	1.41
Mixers	1.41
Pumps	1.27
Rollers, Grade	1.27

**ROLLERS, HOT STUFF**

1.41

**SHOVELS AND DRAGLINES**

1.63

Roofers	1.40
"      "      Helpers	.95
Sheet Metal Workers	1.375
Soft Floor Layers (Linoleum)	1.35
Steamfitters	1.625
"      "      Apprentices	
1st Year	.525
2nd Year	.725
3rd Year	.875
4th Year	1.025
Stone Masons	1.625
Terrazzo Workers	1.35
"      "      Helpers	.95
Tile Setters	1.375
"      "      "      Helpers	1.00
Truck Drivers, Flat Rack and Pickup	1.00
"      "      "      Dump, under 4 yards	1.00
"      "      "      Dump, 4 yards and under 6 yards	1.10
"      "      "      Dump, 6 yards and under 8 yards	1.25
"      "      "      Dump, 8 yards and over	1.40
Well Drillers	1.00
"      "      "      Helpers	.75

Welders--receive rates prescribed for craft performing operation to which welding is incidental.

**HEAVY CONSTRUCTION**

Asphalt Rakers	1.10
Concrete Finishers	1.35
Jackhammermen	1.025
Vibrators	.95
Painters, Spray	1.32
Powdermen	1.175

Part "C"  
Sheet 144

**HEAVY CONSTRUCTION (continued)****PER HOUR**

<b>Power Equipment Operators</b>	
Air Compressors, Stationary	1.375
Asphalt Plants	1.375
Blade Graders	1.60
Cranes, Draglines, Power Shovels over 5 yards	2.00
1 to 5 yards	1.75
Under 1 yard	1.65
Finishing Machines, Cement, Concrete, paving	1.375
Hoists, 1 drum	1.45
" 2 or more drums	1.70
" or derricks on steel	1.65
Locomotive Cranes	1.75
Mixer Operators, 1 to 5 bags	1.375
" " 5 bags and over	1.50
Piledrivers	1.65
Pumpmen, 6 " and over	1.375
Rollers, finishing high type pavement	1.50
" grade and surfacing	1.25
Tractors, 50 H.P. and under	1.40
" over 50 H.P.	1.60
" tandem carryall	1.65
Trenching Machines	1.50
<b>Apprentice Engineers:</b>	
Oilers, all equipment	1.10
Shovel Firemen	1.25
<b>Mechanic (Heavy Equipment)</b>	1.50
Approved by Bureau of Yards and Docks, letter dated September 4, 1942.	
<b>Truck Drivers:</b>	
Flat bed and Misc. body less than 1 ton	.90
" " 1 ton to and including 4 tons	1.00
" " Over 4 tons	1.10
" " Oil distributor driver	1.10
" " Dump, not to exceed 4 yard	1.00
" " Dump, 5 yard capacity	1.05
" " Dump, 6 yard capacity	1.10
" " Dump, 7 yard capacity	1.15
" " Dump, 8 yard capacity	1.20
" " Dump, 9 to 12 yards	1.30
" " Dump, over 12 to 16 yards	1.40
" " Dump, over 16 to 20 yards	1.50
" " Transit Mix and ready mix 1½ yard up to 3 yard	1.00
" " 3 yards and over	1.10
<b>Truck Greasers</b>	1.00
Approved by Bureau of Yards and Docks, letter dated October 6, 1942	
<b>Auto (Shop) Mechanic--</b>	
Approved by Bureau of Yards and Docks Dec. 2, 1942	1.37½
<b>Unskilled Laborers</b>	.95
Approved by Bureau of Yards and Docks, letter dated Sept. 10, 1942	

	<u>PER HOUR</u>
Lineman Approved by Bureau of Yards and Docks, letter dated November 7, 1942	1.50
Groundmen Approved by Bureau of Yards and Docks, letter dated November 7, 1942	1.12½
Wiremen Approved by Bureau of Yards and Docks, letter dated November 7, 1942	1.50
Wiremen's Helper Approved by Bureau of Yards and Docks, letter dated November 7, 1942	.95
Sign Painters and Sign Painters Helpers Approved by Budocks, letter dated 1/27/43.	1.71 - 1.21 -
Truss Erection Specialists To be paid Structural Iron Workers Rate of (Approved by Budocks in Airmailgram 3/25)	1.63
Ross Carrier Drivers (Approved by Budocks Airmailgram 3/25)	1.375
Bridge & Structural Steel Painters (Approved by Budocks 4/9) Airmailgram	1.445
Wiremen - while performing extra hazardous work over 80 ft. above ground except when working in roof of building or where no exceptional hazard exists (Approved by Budocks wire dated 3/7/43)	1.75
Wiremen Foremen (same as above)	2.00

## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### G. Labor Relations

##### 2. Open and Closed Shop Difficulties

There has been no problem regarding this question. This job operated as a closed shop since its inception.

## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### G. Labor Relations

##### 3. Strikes and Cessations of Work

There have been no strikes on this project. There was cessation of work in June of 1943. Approximately twenty five piledrivermen were transferred from one foreman's crew to another foreman's crew. Inasmuch as their new foreman had recently released piledrivermen for being unqualified, this group of men thought they were being transferred to the new foreman just as a means of removing them from the job. Rather than go to work for their new foreman, they asked for their termination.

After they had received their termination, they came to the Personnel office and entered a complaint against the new foreman. The Personnel office refused to take official recognition of their complaint, because; first, they were no longer employees of the company; and, secondly, they had not taken the matter up directly with their union.

When this was explained to the workers, an opportunity was given to them to return to their jobs without impairment to their standing with the company, and all but three of the men returned.



## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### G. Labor Relations

##### 4. Absenteeism

Absenteeism did not become a factor of any considerable importance until the latter part of October, 1942. At that time due to rainy weather and an epidemic of colds and sore throats, the number of absent workers was about 12% of the load.

This condition existed throughout the winter months. Some days the percentage of workers absent would be 20% of all persons employed.

Mondays, as a rule, would show the greatest number of absent workers. Saturdays would ordinarily show the greatest number of workers present on the project. Monday's absentees would generally run about twice as many as the average for the balance of the week.

The effect of absenteeism on progress of the job was far-reaching. It upset effective planning as it was impossible to determine what crews would be short-handed on any given day. It meant that workers had to be shifted around to fill out the crews on the more essential jobs. Next day might show a return of a substantial number of workers to the project and some crews would be overmanned, which again called for a shift of workers.

Following is a schedule showing approximately the percentage of absentees by month, and the average number of workers on the project by the month.

OUTLINE OF NARRATION

IV. ADMINISTRATIVE DISCUSSION

G. Labor Relations

4. Absenteeism (continued)

	<u>Monthly average of workers on project</u>	<u>% of work- ers absent</u>
July, 1942	294	
August	519	
September	915	
October	1213	8.0
November	1260	12.2
December	1488	11.2
January, 1943	1387	12.4
February	1470	10.7
March	1468	10.3
April	1195	7.6
May	1253	5.6
June	1525	5.9
July	1438	5.4
August	1158	5.8

1,184.5  
avg



## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### C. Labor Relations

##### 5. Quality of Labor

The quality of labor on the project as compared with construction projects of several years ago, was materially below average.

This was best evidenced by experience with carpenters. Many men would hire out professing to be qualified carpenters and would give work history on other jobs to substantiate their claim. Actual work experience, however, would show them poorly qualified to do carpentry work. They were the result of the defense building boom. They could nail on siding if some one would cut the boards. They could not do general carpenter work. Such men required far more supervision than the qualified carpenter.

The necessity of hiring inexperienced persons to fill many jobs reduced the quality of the output.

It was necessary to hire boys between the ages of 16 - 18 years and women in order to get anywhere near enough common laborers to man the job. These two classes of workers had very little previous work experience on this type of work.

Truck driving was another classification where the quality of work was materially reduced due to inferior labor.

Many truck drivers, especially the younger

## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### G. Labor Relations

##### 5. Quality of Labor (continued)

group (many of whom were in 4F draft classification), were not able to assimilate or follow orders. They were careless in handling the equipment thereby causing much damage to trucks. The labor turnover was very high amongst truck drivers.

## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### 3. Labor Relations

##### 6. Productivity of Labor

Productivity on the project was governed by several major factors.

The rainy weather, especially during winter months with the resultant mud, was a serious problem. The mud made it almost impossible to operate cats, bulldozers, Lefourneaus. Heavy construction was almost at a standstill during the rainy winter months of November, December, January, February, and March.

The necessity of employing inexperienced personnel reduced the productivity of labor. Boys between 16 and 18 years of age and women were generally without previous work experience and required considerable supervision and training. Older men who had retired from active participation in industry returned to help out in the war effort. The production of many of these men was limited by physical handicaps or old age.

Men engaged in erection of trusses were inexperienced in that type of work. It was necessary to train crews from scratch.

In order to obtain enough men to work as roofers on the hangars, almost any worker who expressed a desire and willingness to work as a roofer, was given the opportunity. Very few experienced roofers could be had. It took considerable time to train men to become fairly

## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### G. Labor Relations

##### 6. Productivity of Labor (Continued)

well qualified as roofers and as a result the roofing program suffered.

The inability of truck drivers as a group to produce was very apparent. Unwillingness to follow orders when out of sight of foreman, lack of ability to assimilate training, carelessness with equipment, damaging same, and the constant and large turn-over of drivers, all had a definite bearing on cutting down the productivity of this group.

The slowing down of all classes of workers by adverse weather, the decided increase of minor injuries that occurred during bad weather, the general inefficiency of labor, the large labor turn-over were all important factors in reducing the general productivity of labor.

## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### 3. Labor Relations

##### 7. Availability of Labor

At the start of the project, local labor supply took care of project needs. During the latter part of August, 1942, the local supply of labor was exhausted, and it was necessary to recruit labor from outside areas.

In the latter part of October, 1942, it became apparent that the project needs could no longer be met from the labor supply available in the state of Oregon and the western part of the state of Washington.

In conjunction with the United States Employment Service, a program of recruiting was worked out whereby pooled interviews would be held in various sections of the middle west in an effort to induce laborers to come to the project. In order to attract workers to these pooled interviews, an advertising campaign was instigated. Advertisements were carried in the Minneapolis and St. Paul newspapers and in newspapers in a number of the surrounding cities and towns.

As a result of these efforts, approximately 300 workers signed up to come to the project. About 85 reported.

The latter part of December and the first part of January pooled interviews were held in Spokane, Washington and Coeur d'Alene, Idaho. This was done to take advantage of the release of workers from the Farragut Naval Station north of Coeur d'Alene, Idaho.

## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### G. Labor Relations

##### 7. Availability of Labor (continued)

Advertisements were carried in Spokane and Coeur d'Alene papers and in papers in nearby towns. Carpenters, general laborers, truck drivers, etc. were recruited from this area.

Newspaper advertisements were carried in the Portland papers at numerous times as well as in papers of other towns in Oregon where there was a possible surplus of labor.

At no time during the existence of the project were all the requirements for the various classifications of workers filled. During the middle of June, 1943, requisitions for general laborers were filled. This was the only time during the existence of the project that this occurred.

The following schedule shows the number of workers needed to fill outstanding labor requisitions. (Sample Days).

Date	Number of Work- ers Needed	No. of differ- ent classification of workers needed
October 22, 1942	183	17
November 24, 1942	101	14
December 19, 1942	242	14
January 20, 1943	354	18
February 22, 1943	177	11
March 22, 1943	257	16
April 22, 1943	176	13
May 21, 1943	360	14
June 22, 1943	56	6

## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### G. Labor Relations

##### 7. Availability of Labor (continued)

Date	Number of Workers Needed	No. of different classifications of workers needed
July 22, 1943	76	12
August 24, 1943	122	4

It became increasingly difficult to obtain the services of workers, especially since June, 1943. In June of this year due to the closing down of several large housing projects in the Portland, Vancouver, and Seattle areas, project labor needs were almost met. However, by the middle of July, 1943, the labor supply was the lowest since the inception of the project. It became progressively worse so that by the end of August, 1943, it was almost impossible to obtain services of common laborers and of carpenters. As near as can be determined, this was due to the urgent demands for harvest hands and the excellent wages being paid for farm help.

Only the Hoisting and Portable Engineers' union and the Electrical Workers' union were able to give much help in making workers available for this project.

The two groups mentioned above were able most of the time to furnish workers when requested. None of the other union groups were able to do so.

Due to the scarcity and the difficulty of obtaining the required help, supervisors were cautioned at all times to only requisition those workers actually needed to meet current demands.

Following is a schedule showing the average monthly employed load, new hires, terminations, and percentage of turnover for the month.

OUTLINE OF NARRATION

IV. ADMINISTRATIVE DISCUSSION

G. Labor Relations

7. Availability of Labor (continued)

<u>Month</u>	<u>High</u> <u>Employ.</u>	<u>Low</u> <u>Employ.</u>	<u>Average</u> <u>monthly</u> <u>Employ.</u>	<u>Termina-</u> <u>tions</u> <u>Month</u>	<u>for % of</u> <u>Turnover</u>	<u>Hires</u> <u>mont</u>
1942						
July	294	0	294	0	0	294
August	744	294	519	115	21.9	565
September	1037	744	915	132	14.4	475
October	1432	1043	1213	175	11.7	570
November	1471	1076	1260	759	60.8	565
December	1622	1171	1488	397	26.0	461
1943						
January	1653	866	1387	273	19.6	614
February	1616	1282	1470	460	33.1	334
March	1654	1081	1468	215	14.6	349
April	1309	1021	1196	687	57.0	290
May	1418	1119	1253	433	34.6	452
June	1673	1371	1526	269	17.6	464
July	1519	1340	1439	266	18.8	345
August	1377	989	1158	296	25.5	165
Average monthly employed load:				1213		
Total terminations to September, 1943				4466		
Average terminations per month				344		
Average turnover per month				28.7%		
Average number of hires per month				4.7		
Total hires to September 1, 1943				5843		

At two different times during the project the demand for workers was nearly met. First was in the second week of January, 1943. The fortunate situation was short-lived due to bad weather which caused a large number of workers to terminate.



## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### C. Labor Relations

##### 7. Availability of Labor (continued)

In the third week of June, 1943, the labor requisitions were almost filled. However, the week prior to July 4 saw many workers leaving the job.

On March 6, 1943, in order to help meet the demand for common laborers, requisitions were placed for women laborers, consequently about 100 women were employed for field work, mostly as laborers, truck drivers, and toolclerks.

The women, as a rule, were not as efficient or capable as men but a fair percentage of these workers could do a creditable day's work.

## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### G. Labor Relations

##### 3. Housing of Labor

The matter of housing did not become acute until the middle of September, 1942. Prior to that time, local citizens had been able to assimilate most of the influx of workers. After September 15, it became difficult for migratory workers to find suitable housing facilities, and it was necessary for such workers to take housing farther and farther from the project site. It was found that the farther the worker had to travel to the project, the greater the turn-over.

On October 12, bunkhouses and a cook house were made available for workers. This camp was established on the project site and could sleep approximately 500 employees and feed 448 employees at one sitting. The camp was filled to a maximum at two different times; namely, January 9, 1943, and June 17, 1943. Board and room was provided at a cost of \$13.00 per week. Blankets, sheets, and pillows were provided for the workers.

As of July, 1943, there was a total of 1,365 housing accommodations for rent listed with the local housing authorities. These listings included single rooms, apartments, homes, auto-courts, and hotel accommodations. These accommodations were open to all persons in the community who were in need of housing facilities.

A number of workers lived in rented accommodations at nearby summer resorts. During the

## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### C. Labor Relations

##### B. Housing of Labor (continued)

winter months, these accommodations were rented for a nominal sum, but during the summer season, many of the workers were obliged to move inasmuch as the owner of the resorts increased the rent of the accommodations to the point where it was no longer feasible for workers to pay the rent requested. As an example; resort cottages that would rent for \$30.00 per month during the winter months, including lights, water, and fuel, cost the tenant \$60.00 to \$70.00 per month during the summer months. These rents were approved by the local housing authority.

The summer rates on resort housing went into effect June 1st and extended through the month of September. Housing facilities were harder to obtain in Tillamook and in areas close to the project. Housing was progressively easier to obtain and in most cases, rents were less, the farther the traveling distance from the project.

The contractor built sixty units in Tillamook and these were first occupied June 16, 1943. More detailed description of this project is given under III-H.

The Government Trailer Camp project was established adjacent to the project site with one hundred housing units. These units were first occupied April 10, 1943, and were filled 100% by contractors' personnel from that date up until approximately August 25th, at which time the contractors' personnel did not require all of the facilities provided by the trailer project.

On September 1, 1942, it became apparent that a housing situation confronted the project. An employee was designated to provide housing information to employees and prospective employees of the company. This housing clerk accumulated information regarding the availability of housing

OUTLINE OF NARRATION

IV. ADMINISTRATIVE DISCUSSION

G. Labor Relations

G. Housing of Labor (continued)

the rest, and the accommodations furnished, and other pertinent information that would be of value to prospective tenants. This service was of great value in helping provide housing for workers.

## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### C. Labor Relations

##### 9. Transportation of Labor

The majority of the workers provided their own transportation from home to project. A large number of workers pooled their rides. A public transportation service was furnished only from Tillamook to the project site; one trip in the morning and one in the evening. During the first part of December, 1942, the transportation company established the practice of making two extra trips in the evenings on Fridays and Saturdays.

On September 1, 1943, the transportation company ceased operating to the project, but bus service was reestablished shortly after by the Station.

Workers were recruited from various states west of the Mississippi; principally in Nebraska, Iowa, South Dakota, Montana, Idaho, Washington, and Minnesota. Transportation was furnished for some of these workers. Most of the workers to whom transportation was paid, paid their own way to Tillamook, but were reimbursed by the company at the rate of one coach fare after being on the job forty five days.

It was found that those persons who were paid transportation after being on the job forty five days were better workers, stayed on the project much longer even after their transportation was paid, than those whose transportation was furnished to the project.

OUTLINE OF NARRATION

IV. ADMINISTRATIVE DISCUSSION

G. Labor Relations

9. Transportation of Labor (continued)

Copies of travel agreement used are attached and are a part of this report.

## AGREEMENT

THIS AGREEMENT, entered into between SOUND CONSTRUCTION & ENGINEERING CO., of Tillamook, Oregon, party of the first part, hereinafter referred to as the "Contractor", and the person whose signature appears below, indicated and referred to as "Second Party", provided that:

I. Second Party agrees to immediately proceed from the place of contract to Tillamook, Oregon, where he will enter into the employ of the contractor in the construction of the Lighter-than-Air Base, and continue in the employ of the Contractor so long as his work is satisfactory, to the Contractor and so long as the Contractor is able to provide employment for him.

II. Contractor agrees to reimburse Second Party for travel between the place of contract and the place of employment as herein indicated, at the rate of single one-way coach fare as defined and guided by common carrier rates and by traveling the most direct and shortest route between place of contract and place of employment.

III. Payment for travel will be made Forty-five (45) days after the date of employment, provided Second Party's work is satisfactory.

IV. It is agreed and understood that Contractor assumes no responsibility and shall in no way be liable for any injuries, damages and/or fatalities that may be suffered by Second Party and/or any other persons accompanying said Second Party that may occur or be incurred while en route to Tillamook, Oregon, as aforesaid.

V. This AGREEMENT shall become null and void 15 days after date of contract unless presented to the employment office of Contractor at Tillamook, Oregon and Second Party accepts employment.

VI. Second Party hereby certifies that he is a citizen of the United States, or if naturalized will furnish naturalization papers as evidence of his citizenship.

Place of Contract \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_

Dated this \_\_\_\_\_ day of \_\_\_\_\_, 194\_\_.

SOUND CONSTRUCTION & ENG. CO

By \_\_\_\_\_

Title \_\_\_\_\_

Second Party \_\_\_\_\_

## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### G. Labor Relations

##### 10. Efficiency of Labor (general)

The efficiency of labor generally was pretty well distributed on an occupational basis. Certain occupational classifications such as mechanics, machinists, operators of heavy equipment, etc., were generally more efficient than carpenters, truck drivers, or general laborers. Probably one of the reasons for this is that it is easier for a workman to join a carpenters' or truck drivers' union without a great deal of experience and training, and can then hire himself out in either of these capacities.

Also, there was a need for a greater number of truck drivers, carpenters, and laborers than for other classifications, with the result that in order to obtain the required number of workmen, less efficient men were employed.

As the job declined, the efficiency of the laborer increased as the less qualified workers were terminated or were removed from the project and the better men were retained. Also, workers who had been on the job for a period of time had become more proficient in their tasks and did more and better work in less time.



## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### H. Factors Contributing to Costs

##### 1. Weather Conditions

Under Technical Discussion, Construction History, Progress, Conditions affecting, weather (III-A-7-b-(1)) a detailed description of adverse weather conditions prevailing through certain periods of the construction was given. Completion schedules made it imperative that work be carried on without diminution throughout these periods and, in consequence, some unit prices, particularly that of grading were higher than if work had been curtailed or stopped as is ordinarily the custom during these seasons of inclemency.

## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### H. Factors Contributing to Costs

##### 2. Labor

Under the preceding heading "Labor Relations" (IV-g) is discussed in full the labor situation from all angles. In this discussion full attention was given to the factors, among others, which contribute to the costs of construction. All of these which principally influence labor cost, namely, quality and productivity of labor, absenteeism, availability, and wage scale were uniformly of such character as to tend to produce unsatisfactory unit costs. As Tillamook was in one of the most critical labor areas in the U. S. very little could be done to alleviate this situation.

## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### H. Factors Contributing to Costs

##### 3. Site Conditions and Characteristics

The most pronounced conditions peculiar to the site which had an adverse effect on the costs of the project were, in order, the topography which made necessary the moving of a great deal more earth than was required at other similar stations, the topsoil unfit for a base under much of the area which necessitated the removal of more than a million cubic yards of this muck and replacement by a million cubic yards of gravel, the varying and unpredictable nature of the sub-surface soil which necessitated long and expensive foundation designs.

## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### H. Factors Contributing to Costs

##### 4. Inefficiency or Efficiency of Contractor

Under another heading Progress, Conditions effecting, (III-A-7-b-(8)) is a general discussion of the contractor's efforts toward maintaining a high rate of progress. It is believed that most of these efforts also had an equally good effect on final costs. The contractor spared no pains to produce an economical job, his best equipment was furnished, key personnel who had proved themselves on other projects were provided and many expenses of a non-reimbursable nature were incurred to promote the well being of the job.

## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### II. Factors Contributing to Costs

##### 3. Availability of Materials and Equipment

No particular influence on costs existed because of unavailability of materials and equipment except for the effect that probably resulted from the fabricator's inability to meet previously-agreed-upon schedules of shipment of the hangar roof truss members.

## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### H. Factors Contributing to Costs

##### 6. Uneconomical Design

There were no evidences of uneconomical design. Some design was expensive but was made so by the exigencies of the job and in such case could not be deemed uneconomical.

## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### H. Factors Contributing to Costs

##### 7. Miscellaneous Unforeseen Difficulties

Unforeseen difficulties contributing to higher costs other than those discussed above were few. Perhaps the only added expense of this nature was the cost incurred in changing the Tillamook water mains under the landing mat area to minimize the chance of future trouble due to failure of these lines. The work done is discussed in another place (III-E).

## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### 1. Factors Contributing to Costs

##### 3. Changes and Revisions by Navy After Start

After the project was started, the only change made by the Bureau which influenced the cost adversely was the cancelling of Hangar "A" after considerable work had been done on it and later reinstating that hangar.

Some added expense was incurred through changes that were requested by the operating personnel of the station.



OUTLINE OF NARRATION

IV. ADMINISTRATIVE DISCUSSION

I. Profit

1. Contractors, Discussion of

Column 1.	Column 2.	Column 3.
Net Cost	Contractors' Fee	Percentage 1.
\$15,340,749.33	217,440	1.417

The percentage of contractors' fee to the net construction cost does not seem excessive for this type of contract and construction. Since several items of expenditure by the contractor are not reimbursable, the actual net percentage of fee earned as profit would be proportionately lower if these non-reimbursable costs were deducted.

OUTLINE OF NARRATION

IV. ADMINISTRATIVE DISCUSSION

I. Profit

2. Architect-Engineer

The work performed by the Architect-Engineer was done under Contract NCy-5614.

<u>Construction Work for which AE Services were Performed</u>	<u>Fee</u>	<u>Percentage</u>
3,636,000	27,000	0.73

The percentage of fee based on the construction cost does not seem excessive taking all factors into consideration.

## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### J. Close-out Procedure (Contractor)

##### 1. Processing

The preparations for closing out the CPFF Contract were made well in advance of the actual date of termination of field work under that contract with the result that a large portion of the preliminary schedules were prepared during the thirty days preceding October 15, 1943, the date the CPFF contract was to be terminated.

At the close-out date, the contractor forces were engaged in making a final inventory for the Bureau's Surplus Materials Board. The Board gave disposition of all materials on October 20 and 21st and immediately materials and equipment were shipped. Practically the entire contractor's office staff as well as the Navy office staff were engaged for the next 30 days in the preparation of shipping orders, memorandum invoices, and other necessary instruments required for transfer of materials and equipment. It was determined that the transfer of materials and equipment should be accomplished prior to the closing out of the Contractor's books, consequently the preparation of completion schedules and reports for the close-out was somewhat delayed during this period.

The actual preparation of the various schedules was prepared in accordance with the Manual and Circular Letters. Rough drafts were prepared by the Contractor and submitted to the

## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### J. Close-out Procedure (Contractor)

##### 1. Processing (continued)

Navy office for checking. The majority of schedules were returned for corrections and/or additional data. Most corrections or additions were necessitated because of the varying interpretations of instructions as contained in the directives. Finally approved rough drafts were returned to the contractor who then prepared the schedules in final form. Upon presentation of the final schedules to the Navy office, they were then rechecked for corrections and additions and filed in the Completion Report file and marked "Completed."

Final close-out of the CPTF contract was accomplished under Sound Construction & Engineering Co. Lump Sum Contract Wcy-7969 and P. L. Tidball lump sum contract Wcy-7940, which provided for the salaries of the Navy employees engaged in the closing out.

## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### J. Close-out Procedure (Contractor)

##### 2. Time Required For

The time schedule for submission of the various parts of the Completion Report was met to a certain degree. Unforeseen conditions and adjustments arose which held up certain items.

Preparation of certain schedules was started in September, 1943 and from that time to the date of submission of the Completion Report, both the Contractor's and Navy office staffs were actively engaged in the preparation and checking of the various schedules and reports required.

Certain of the minor schedules such as "Unclaimed Balance in War Bond Account," "List of Unclaimed War Bonds," "Unclaimed Wages," etc. were not completed until the last possible moment in order to allow for the clearing of checks, delivery of mail etc.

OUTLINE OF NARRATION

IV. ADMINISTRATIVE DISCUSSION

3. Close-out Procedure (Contractor)

3. Engineering and Service Contract

Not applicable

## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### K. Security of Records

##### 1. Fireproof Vault

Two fire resistant vaults have been provided in the building now used for the contractor's and CINCPAC's staffs, one in the east wing and one in the west. These vaults are 10 ft. by 12 ft. inside with brick walls, metal clad doors and a roof built of 2" x 8" s laid on edge. These vaults were used for the safe storage of all original records and documents, on the CPWT Contract and can now be used for the safe keeping of all permanent records.

## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### K. Security of Records

##### 2. Filing System

The filing system was completely adequate and was capable of being operated with speed and ease. Much care was exercised to avoid duplicate files and unnecessary, cumbersome and complicated cross filing. This filing system was under the jurisdiction of a competent supervisor who had specialized in this kind of work on CPFF contracts.



## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### L. Relations with Contractor

Relations with the contractor were at all times excellent. Requests for changes of method or schedule were met with general acceptance and in emergencies work proceeded immediately with the understanding of all concerned that the necessary authorizations and agreements would be forth coming as soon as possible.

At certain times during construction, minor employees of the contractor were dismissed for various reasons, upon recommendation of the officer in charge. However, the key personnel of the contractor were exceedingly cooperative and efficient at all times and complied with all requests of the Navy Department without question.

## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### M. Effects on Contract by Miscellaneous Items

##### 1. Priorities

Priority rating A-1-a was originally assigned to this Project. On July 15, 1942, the contract was re-rated A-A-3. This latter rating, with exceptions as noted below, continued in effect until the completion of the Project.

By re-rating directive issued January 6, 1943, a new rating, A-A-1, was assigned to Project 5, Helium Storage and Distribution, value of which was \$334,540.00; and P22, Gasoline Storage and P23, Fuel Storage, value of \$134,761.00. By re-rating directive issued February 27, 1943, a new rating, A-A-2-x, covering the remaining value of \$200,000.00 for each of the following projects, was assigned: No. P24, Utilities (Sewer, water and power) and P47, Steam and Telephone facilities.

Limitation order L158 as amended March 11, 1943, required that no replacement parts for motor vehicles be delivered to or for the account of the army or navy except upon receipt of an order bearing a preference rating of A-A-1 or higher. This rating was obtained by submitting application on form PD3A to the OinCC. CMP5 regulation automatically assigned a preference rating of A-A-2-x (subsequently changed to A-A-2) to this type of project. After the effective date this preference rating was used in obtaining materials for maintenance and repair.

Occasionally it was necessary to request a higher

## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### W. Effects on Contract by Miscellaneous Items

##### 1. Priorities (continued)

rating such as A-A-A to procure critical materials that could not be delivered on or before the required delivery date on regular assigned priority. Applications for these higher ratings were made through proper channels.

It can be said that the priorities system worked no hardship on the project.

## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### 1. Effects on Contract by Miscellaneous Items

##### 2. Personnel

The contractor's key personnel was generally well qualified and cooperative. In some few instances, there were misfits, the inept, and malcontents. On account of the comparatively unpleasant living conditions it was hard to keep the entire force happy and content at all times and it was extremely difficult to hold all individuals on the job. However, the contractor maintained a vigilant look out for those who were not functioning to the high standard set by the organization as a whole and they were replaced without hesitation as soon as possible.

## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### 1. Effect on Contract by Miscellaneous Items

##### 3. Pay Stabilization

Pay stabilization had no untoward effect on the conduct of the contract. The range of pay established permitted equitable compensation for the more highly qualified workman and rates were in line with those prevailing in the area. Consequently, there were no complaints when rates were stabilized.

Executive Order #9250 stabilizing rates of pay was duly observed and complied with and no increases were allowed without the investigation and conclusion of the CIOCC that the employee affected had assumed increased responsibilities.

Wage schedules were filed weekly with the Wages and Hours Division of the Department of Labor in Portland and with the Bureau of Internal Revenue of the Treasury Department in Seattle. No complaint or comment was ever received from either agency.

## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### 3. Effect on Contract by Miscellaneous Items

##### 4. Pay Schedules - Principals

Rates of pay of the principal employees were established at the start of the contract after review and approval of schedules by the OINCC and the Superintending Civil Engineers. Rates established were comparable and in most cases the same as paid by the contractor on other CPTF and lump sum contracts in this territory.

## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### M. Effect on Contract by Miscellaneous Items

##### 5. Travel

Travel to and from the job was a serious problem. At the start of the job a local bus company was persuaded to establish a line from Tillamook to the job site. The fare was comparable to others for such service in this area. This service continued until September at which time the Station established a Navy owned and operated bus service for station personnel and its use was extended to the employees of the contractor. Due to the strict schedule maintained by bus operators, its use was not practical to the majority of employees. The bus left the station before 5:00 p.m. and anyone that had not ceased working by 5:00 was generally stranded unless a motorist offered transportation. For that reason and the fact that only a portion of the employees actually resided in Tillamook proper, private cars provided better than 99% of the transportation.

## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### M. Effect on Contract by Miscellaneous Items

##### 6. Traffic

Generally speaking, transportation facilities to the project were adequate. In addition to the Southern Pacific Railroad there were four regularly operated truck lines and the Railway Express Co. Also available were some five or six trucking concerns operating principally from Portland.

Some delay was experienced on carload traffic because of congestion in the Portland terminal and slow operation of road trains handling tremendous volumes of traffic. The Tillamook-Portland branch of the Southern Pacific Co. was the only rail connection between the station and Portland and some delay was experienced when service was discontinued due to slides, forest fires, and wrecks. Serious delays were somewhat alleviated by policing through all carriers each car that was required on schedule.

All deliveries of carload traffic were received at Tillamook until the rail connection between the station and Tillamook was completed on January 13, 1943. This line was approximately three miles in length and the Southern Pacific Company performed switching on an hourly basis at a rate of \$16.00. From the start of switching service until the end of the job the average charge per car was approximately \$2.61. Records indicate that approximately 3000 carloads were handled to and from the station.



## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### W. Effect on Contract by Miscellaneous Items

##### 6. Traffic (continued)

Outbound cars consisted of surplus materials and equipment, and represents but a small percentage of the total.

LCL and LTL tonnage approximated 3000 tons. Tillamook-Portland Auto Freight handled approximately 76%, Southern Pacific and Pacific Motor Trucking 17%, Tillamook Coast line 5% and the balance between Railway Express and Salem-Tillamook Auto Freight.

"Anywhere-for-Sure" trucks handled the bulk of the treated lumber and spasmodic movements of machinery and equipment where rail service would have been too slow or inadequate.

Expense bills were audited for correctness of rate and extensions. A fair line of tariffs was maintained for this purpose with particular emphasis being placed on truck tariffs. A daily check was made of all carloads on hand and from this, demurrage could be reduced. Total demurrage for the entire construction period amounted to approximately \$466.00.

Government bills of lading were utilized to the fullest extent possible on all inbound materials. Contacts were made with vendors at the time materials were ordered, and if in sufficient quantity and weight, the vendors were instructed to use GBL. Arrangements were made to have the GBL sent to them in time to meet shipping schedules.

## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### X. Effects on Contract by Miscellaneous Items

##### 7. Overtime

a. Overtime was authorized in the contract as a means of obtaining the "speed-up" program contemplated. The field forces generally worked nine hours per day six days per week.

All working schedules were approved by the CINCPAC before being put into effect.

Shift work was used whenever possible to cut down overtime payments and to utilize equipment to the best advantage, but dim-out regulations limited the amount of night work that could be done.

b. It was necessary in order to hold personnel on the job to work nine hours per day six days per week as other projects in the area were working nine to ten hours per day for at least six days per week.

## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### H. Effects on Contract by Miscellaneous Items

##### 2. Civilian Guard and Identification Department

The first guard set-up started July 18, 1942, and consisted of a Chief of Guards and two assistants. About the same time the Identification Department was established and workmen already on the job were called in, fingerprinted, picture passes were issued, and Personal History forms filled in.

By about the middle of August, this back work had been completed, and new hirings were identified by same means, viz: finger prints, picture passes, personal histories and employer's number badges. This same method was followed throughout the construction for the Architect-Engineer and all sub-contractors.

About September 1st, 1942, the Civilian Guard force was re-organized. This Civilian Guard organization consisted of about thirty civilians with special police authority whose original duties embraced the total security of the area; inside patrol, all entrances and exits, fire watch, etc., 24 hours per day, 7 days per week.

As the number of enlisted men increased, the Navy gradually took over the gates and patrol of all Navy areas and Navy property, until the duties of the Civilian Guards consisted mainly of watch over Contractors' property, until finally on August 30, 1943, it was reduced to nine guards and a Fire Chief and comprised mainly a

## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### M. Effects on Contract by Miscellaneous Items

##### 8. Civilian Guard and Identification Department

fire watch retaining, however, Special Police powers.

With the arrival of the Navy personnel in substantial numbers and the organization of Civil Service and Public Works Departments by the Navy, the Civilian Guard Identification Department by the Navy, the Civilian Guard Identification Department took fingerprints and pictures for Navy I. D. Cards and Navy civilian employees. These fingerprint cards and films, however, were turned over to the Navy Security Officer.

By August 1, 1943, the Security Department of the Station had set up its own facilities for this work, but the Civilian Department still acted as standby for them.

The Identification Supervisor was responsible for taking fingerprints and filling the cards. Duplicate copies of fingerprint cards were made, one being kept in the files and the other forwarded to the Seattle office of the Federal Bureau of Investigation. A list of cards sent each day was furnished the Naval Intelligence Officer who received reports from the Federal Bureau of Investigation. These returns enabled the Intelligence Officer and the Security Officer to watch certain individuals. Several "wanted" men were apprehended through these reports.

The Identification Supervisor, in addition to maintaining files of fingerprint cards, was custodian of picture passes, both unissued and terminated.

Rigid security measures had little effect on the Contract except for the slight loss in time in being checked at the gates.

OUTLINE OF NARRATION

IV. ADMINISTRATIVE DISCUSSION

II. Effects on Contract by Miscellaneous Items

3. Air Raid and Blackout Drills

a. Delays due to

Only one air raid drill was held during the life of the contract and the effect on the contract was negligible.

OUTLINE OF NARRATION

IV. ADMINISTRATIVE DISCUSSION

M. Effects on Contract by Miscellaneous Items

2. Air Raid and Blackout Drills

b. Costs of

It was estimated that this drill increased the cost of construction approximately \$5,000. However, it was thought that participation in this drill was justified as it was a combined Army and Navy air raid drill for the entire area.

## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### N. Surplus Property Center, Discussion of

Surplus property started to be transferred from this activity in July, 1943, in accordance with existing instructions. Surplus property lists were prepared and forwarded to the Superintending Civil Engineer's office in San Francisco for distribution. Officers in Charge and Resident Officers in Charge of Construction and other activities contacted this office for transfer of surplus property. This office then communicated with the Bureau for authority to transfer. This method of preparing surplus property lists, forwarding them, the necessary approvals and other required actions tended to retard the actual physical transfer of surplus property during this period.

It was not until August, 1943, when the Surplus Materials Board was established, that surplus property was transferred in any great amount. New surplus property lists were prepared and the Board visited this site in September and gave disposition on the majority of items. Since the disposition, as indicated by the Board, was final, the surplus property was immediately shipped out as fast as the field forces could accomplish the work.

The transfer of surplus property was further simplified when the Surplus Materials Board gave this activity blanket authority to transfer certain surplus materials and equipment to designated activities. This included such items as dunnage lumber to Oakland; new lumber to Fort Huachuca; and heavy duty equipment and parts to ElginCO, Vernon, Calif.

## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### H. Surplus Property Center, Discussion of (continued)

On October 20 and 21, the Board again visited this site and gave disposition on the final surplus property lists. By November 15th, the bulk of all surplus property was transferred.

The automotive equipment, under the cognizance of the Domestic Transportation Officer, was transferred in accordance with instruction from that office. As automotive equipment could be released from this contract, the Domestic Transportation Officer would dispatch his representatives to the site for inspections and disposition. The bulk of automotive equipment was convoyed to Seattle, Washington by the contractor's forces.

- |   |                |
|---|----------------|
| 1. Possible salvage value of property                                     | \$1,250,652.90 |
| 2. Actual " " " "   | 11,307.90      |
| 3. Losses to contract from transfer of property without exchange of funds | 1,239,355.00   |



## OUTLINE OF NARRATION

### IV. ADMINISTRATIVE DISCUSSION

#### 0. Recommendations of CinCC as to Means of Completion at Termination of CPFF Contract

The CinCC recommended that the project be completed under a negotiated lump sum contract with the same contractor. The basis for the recommendation was that all remaining work was already underway at the close of the CPFF contract and it would not have been to the best interest of the Navy to advertise for bids.

It was necessary to carry the staff of the CinCC on a separate payroll for the execution of the lump sum contract.

There was very little work remaining under the CPFF contract at the time of conversion to a lump sum contract and it is estimated that the conversion cost about \$7,500 more than if the contract had continued as CPFF.

OUTLINE OF NARRATION

V. RECORD AS-BUILT DRAWINGS

The Manual and the latest Bureau directives have been complied with, and "Record As-Built Drawings" as shown on the attached list were forwarded to the Bureau on 20 December 1943.

## OUTLINE OF NARRATION

### V. RECORD AS-BUILT DRAWINGS (Continued)

#### Drawings Sent to Bureau

#### ACCESS RAILROAD

##### J. W. Cunningham & Associates

<u>Drawing No.</u>	<u>Title</u>
117	Railroad - Pier Details of Bridge for Trask River Crossing.
284	" - Farm Overcrossings.
341	Map of Access Railroad Right-of-Way.
426	Access Railroad - Grade Crossing with Tillamook County Road No. 12B.
427	" " - Grade Crossing with Tillamook County Road No. M-13.
428	" " - Grade Crossing at Tillamook County Road No. 30-B.
431	" " - Fencing Plan.
432	" " - " " - Details at Trestles #3 to #5, Inc.
438	" " - Tillamook Drainage District.
451	" " - Alignment and Profile.
452	" " - " " "
453	" " - " " "
465	" " - 10" Tile Drains and Graded Underpasses.
519	" " - Common Standard Pile Trestle.
520	" " - Switch Stands.
521	" " - Switch and Derail Layout.
522	" " - Miscellaneous Details.
523	" " - Right-of-Way Monuments.

#### GRADING AND DRAINAGE

##### J. W. Cunningham & Associates

18	Diversion Ditch - Headwall for Culvert under State Highway.
150	Plan and Profile - Diversion Ditch.
194	Gatehouse Area - Grading Plan.
329	Outfall Drainage Ditch to Trask River.
508	Finished Grade Contours - Garage Area.
509	" " " and Sidewalk Layout - Administration and BOQ Area.

## OUTLINE OF NARRATION

### V. RECORD AS-BUILT DRAWINGS (Continued)

510	Finished Grade Contours - Barracks Area.
511	" " " - Dispensary Area.

#### Sound Construction & Engineering Company

324	Outfall Drainage Ditch to Trask River - 48" Culvert
346	Profile of Grading, Drainage - Additional Paving Mats 4-5-6.
348	Detail of Hangar "B" Apron and Taxiway - 5 Ditches.
400	Hangar "B" Apron - Taxiway No. 5 Grades, Drainage and Ditches.
559	Outfall Drainage - Long Prairie Road.
588	Profile - Taxiway No. 5.
597	Realignment of Diversion Ditch.
625	North Interception Ditch - Officers' Residences to Pigeon Loft.
826	Substation Entrance and Protective Dykes.

### HANGARS "A" AND "B"

#### J. W. Cunningham & Associates

269	Hangar - Utility Tunnel.
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#### Sound Construction & Engineering Company

451	Electrical Fixture Hangers on Hangar Truss.
475	Interference Drawing - Plan of Shops - Col. #38 to
476	" " " " " " " " " " " 27 to 3
477	" " " " " " " " " " " #18 to
478	" " " " " " " " " " " #12 to
479	" " " " " " " " " " " #4 to #
480	" " " " " " " " " " " #7 to #
481	" " " " " " " " " " " Helium Exhauster Compressor.
482	" " " " " " " " " " " Plan of Offices - Col. #35 to
483	" " " " " " " " " " " " #25 to
484	Transformer Vault - Switch Gear - Bolt Layout.
485	" " " " " " " " " " " - Bolt Layout.
488-A	Hangar "A" Pipe Trench - Replaces Tunnel.
489-A	" " " " " " " " " " " Lean-tos - Office and Shop Sides.
494-A	Transformer Vault - Switch Gear.
495-A	" " " " " " " " " " "
635	Floodlight Control - Hangar "B".
636	" " " " " " " " " " " "A".

## OUTLINE OF NARRATION

### V. RECORD AS-BUILT DRAWINGS (Continued)

637 Floodlight Control - Hangars "A"- "B".  
642 Log of Footing Excavations - Hangar "B".  
643 " " " " - " " "A".

#### Newbery-Chandler-Tillamook

8 Hangar "B" - Panel Mounting Details.  
9 " " - Electrical Details - Mounting Method  
for Thompson Fixtures.  
10 " " - Electrical - Transformer Vault Details  
11 " " - " - Obstruction Lighting.  
12 " " - " - " Lights and  
Floodlights.  
14 Hangar Electrical Pits - Details.  
18 Hangar "A" - Doors and Girders - Electrical Plans.  
21 Floodlight Control and Services to Control Tower.

#### MOBILE MOORING MASTS AND SERVICES

##### J. W. Cunningham & Associates

138 Mooring Circles - Mast Anchorage Facilities.  
161 " " - 4, 5, 6 - Utilities Plan.

##### Sound Construction & Engineering Company

339 Mooring Mast - Incorporating Watchman's Shack.  
345 Plan of Grading, Drainage and Additional Paving -  
Mats 4-5-6.  
561 Grading Plan - Circle 7.  
563 Power and Telephone Line to Mooring Circles.

#### HELIUM REPURIFICATION BUILDING

##### Sound Construction & Engineering Company

526 Repurification Building - Plans.  
527 " " - Elevations.  
528 " " - Sections and Details.  
529 " " - Details of Windows and  
Doors.  
530 " " - Sections and Details.  
531 Helium Repurification Building - Reinforcement.  
532 Repurification Building - Compressor Foundations -  
Pipe Trench.  
599 Water and Sewer - Helium Repurification Building.

## OUTLINE OF NARRATION

### V. RECORD AS-BUILT DRAWINGS (Continued)

#### Newbery-Chandler-Tillamook

13 Helium Repurification Building - Electrical plans.

#### BARRACKS

##### J. W. Cunningham & Associates

43	Barracks Building	- Plans and Details.
44	" "	- Elevations and Sections.
45	" "	- Miscellaneous Details.
46	" "	- Construction Details.
58	" "	- Plumbing Plan.
59	" "	- Electrical Plan.
60	" "	- Heating Plans and Details.

#### MEN'S MESS HALL

##### J. W. Cunningham & Associates

133	Men's Mess Hall	- Foundation Plan and Details.
134	" "	- First Floor Plan.
135	" "	- Roof Framing Plan and Details.
136	" "	- Elevations and Sections
137	" "	- Miscellaneous Details.
138	" "	- Galley, Bakery and Scullery Details
139	" "	- Heating, Plumbing and Refrigeration - Foundation Plan.
190	" "	- Heating, Plumbing and Refrigeration - First Floor Plan.
216	" "	- Electrical Plan and Details.

##### Sound Construction & Engineering Company

535 Men's Mess Hall - Equipment Details.

#### COLD STORAGE BUILDING

##### J. W. Cunningham & Associates

142	Cold Storage Building	- Plans.
143	" "	- Elevations and Sections.
187	" "	- Details.
218	" "	- Refrigeration and Electric Plans.

## OUTLINE OF NARRATION

### V. RECORD AS-BUILT DRAWINGS (Continued)

#### SENIOR BACHELOR OFFICERS' QUARTERS

##### J. W. Cunningham & Associates

61	Senior B.O.Q. - Plans and Details.
62	" " - Elevations and Sections.
63	Senior Bachelor Officers' Quarters - Construction Details.
64	Senior B.O.Q. - General Details.
66	" " - Plumbing Plans and Details.
67	" " - Electrical Plans and Details.
65	Senior and Junior B. O. Q. - Revised Foundation Pl.
99	Senior B.O.Q. - Heating Plans and Details.

#### JUNIOR BACHELOR OFFICERS' QUARTERS

##### J. W. Cunningham & Associates

53	Junior Bachelor Officers' Quarters - Plans and Details.
54	" " " " - Elevations and Details.
55	" " " " - Framing Detail.
56	" " " " - Plumbing and Heating - Plan and Details.
57	" " " " - Building 4A - Electrical Pl.
57	" " " " - Building 4B - Electrical Pl.

#### OFFICERS' MESS HALL

##### J. W. Cunningham & Associates

144	Officers' Mess Hall - Foundation Plan - Details - Plot Plan.
271	" " " " - First Floor Plan.
272	" " " " - Elevations and Sections.
273	" " " " - Ceiling Joist Framing.
274	" " " " - Roof Framing Plan - Sections and Details.
275	" " " " - Trusses and Sections.
276	" " " " - Interior Details.
263	" " " " - First Floor Plan - Heating and Plumbing.

## OUTLINE OF NARRATION

### V. RECORD AS-BUILT DRAWINGS (Continued)

284	Officers' Mess Hall	- Foundation Plan - Seating and Plumbing.
286	" " "	- Galley Fixtures and Cooler Rooms.
288	" " "	- Electrical Plan and Details.
290	" " "	- Misc. Cabinet Details, etc.
291	" " "	- Window and Recreation Room Details.

### OFFICERS' RESIDENCES

#### J. W. Cunningham & Associates

470	Officer's Residence No. 1	- Foundation and First Floor Plans - Kitchen Details.
471	Officer's Residence No. 1	- Elevations and Details.

#### Sound Construction & Engineering Company

450	Officer's Residence No. 1	- Details.
454	" " No. 2	- Foundation and Floor Plans.
455	Officer's Residence No. 2	- Elevations and Details.
456	" " No. 2	- Details.

#### Newbery-Chandler-Tillamook

1	Officers' Residences Nos. 1 and 2	- Electrical Plans.
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### RECREATION BUILDING

#### J. W. Cunningham & Associates

320	Recreation Building	- Foundation Plan.
322	" "	- First Floor Plan.
323	" "	- Elevations.
324	" "	- Elevation and Section.
325	" "	- Sections and Elevations.
326	" "	- Ceiling Framing Plan.
327	" "	- Roof Framing Plan.
328	" "	- Exterior Details.
377	" "	- Truss Details.
378	" "	- Fixture Details.
379	" "	- Miscellaneous Interior and Exterior Details.



## OUTLINE OF NARRATION

### V. RECORD AS-BUILT DRAWINGS (Continued)

454	Recreation Building	- Plumbing and Heating Founda- tion Plan.
455	" "	- Plumbing and Heating First Floor Plan - Details - Air Ducts.
484	" "	- Electrical Plan and Details.
485	" "	- Revisions in Projection Room.
537	" "	- Miscellaneous Details.

### ADMINISTRATION BUILDING

#### J. W. Cunningham & Associates

27	Foundation Plan, First Floor Plan, Foundation Plan and Details.
28	Second Floor Plan, Third Floor Plan.
29	First Floor Framing Plan, Second Floor Framing Plan, Roof Framing Plan.
30	Elevations.
31	Miscellaneous Details.
32	Structural Section.
33	Main Entrance Details.
34	Porch and Corner Window Details.
35	Stair Details.
36	Millwork Details.
49	Plumbing and Heating, Foundation and First Floor, Plans and Details.
50	Plumbing and Heating, Second and Third Floors, Plans and Details.
51	Electrical Plans, Foundation and First Floor.
52	Electrical Plans, Second and Third Floors.
98	Electric Antenna Mast, Two Required, and Tower Mast Details.
193	Antenna Masts.

### RADIO TRANSMITTER BUILDING

#### Sound Construction & Engineering Company

604	Transmitter Building	- Foundation - 1st and 2nd Floor - Roof Plans.
605	" "	- Elevations - Details.
606	" "	- Details.
607	" "	- Re-Steel Plans - Details.
608	" "	- Steel Reinforcement.

OUTLINE OF NARRATION

V. RECORD AS-BUILT DRAWINGS (Continued)

309	Transmitter Building	- Electrical Grounding Plan.
310	"	- Electrical Grounding Plan, and Elevations.
311	"	- Electrical Plans.
340	"	- Antenna Supports - Location and Detail.

DISPENSARY

J. W. Cunningham & Associates

339	Dispensary	- Basement and Foundation Plan.
414	"	- First Floor Plan.
415	"	- Elevations.
416	"	- First Floor Framing.
417	"	- Ceiling Framing Plan.
418	"	- Roof Framing Sections.
419	"	- Window Details.
420	"	- Ambulance Entrance.
421	"	- Details of Entry No. 1.
422	"	- Basement Plumbing Plan.
445	"	- Basement Heating Plan.
446	"	- Plumbing and Heating Plan and Details.
447	"	- Plumbing Details.
450	"	- Electrical Plan and Details.
461	"	- Fixed Furniture Details - X-ray - Physics - Utility Room, etc.
464	Boiler Setting Details	- Dispensary and Recreation Bldg.
467	Dispensary	- Fixed Furniture Details - Pharmacy, Dental, etc. - Entry No. 3 Revision.
468	Dispensary	- Miscellaneous Interior Details and Laboratory Fixed Furniture.
524	General and Electrical Plan	- X-ray Room from Westinghouse X-Ray Co., Inc. drawing No. 370-1590-

Sound Construction & Engineering Company

513	Dispensary Bldg.	- Physiotherapy Room - Details of Electrical Screening.
514	Dispensary Bldg.	- X-ray Room - Details of Electrical Screening.

STATION MAINTENANCE AND UTILITY SHOP

J. W. Cunningham & Associates

OUTLINE OF NARRATION

AVE. RECORD AS-BUILT DRAWINGS (Continued)

139	Station Maintenance and Utility Shop - Plans, Elevations and Details.
136	Station Maintenance and Utility Shop - Plumbing and Heating.
207	Station Maintenance and Utility Shop - Electrical Details.

CENTRAL STEAM PLANT

J. E. Cunningham & Associates

475	Central Steam Plant - Elevations and Sections.
477	" " " - Plans and Details.
478	" " " - Framing Details.
479	" " " - Framing Elevations.
480	" " " - Roof Framing.
481	" " " - Mechanical Plan.
482	" " " - Mechanical Details.
483	" " " - Mechanical Details.
487	" " " - Plumbing Plan and Details - Electrical Plan and Details.
501	" " " - Section.
525	Brick Stack for Central Steam Plant.

Sound Construction & Engineering Company.

504	Central Steam Plant - Scale Details.
513	" " " - Connection of Conveyor.
581	" " " - Details of Iron Work.
582	" " " - Details of Iron Work.
583	" " " - Details of Iron Work.
586	" " " - Foundations for Boilers.
602	" " " - Deck for Feed Water Heater.

CONVEYOR SYSTEM - CENTRAL STEAM PLANT

Sound Construction & Engineering Company

319	Central Steam Plant - Suspension of Conveyor No. 3 from Roof Trusses.
378	Plot Plan - Fuel Conveyors - Power Plant.
585	Fuel Unloading Pit - Steam Plant.
586	Fuel Reclaiming Pit - Steam Plant.
527	Unloading Pit Grading - Power Plant.
591	Plan - Fuel Conveyors - Power Plant.

OUTLINE OF NARRATION

V. RECORD AS-BUILT DRAWINGS (Continued)

592 Section M-M Fuel Conveyors - Lower Plant.  
593 Section N-N Fuel Conveyors - Lower Plant.  
594 Cross Sections - Fuel Conveyor - Lower Plant.  
595 Miscellaneous Details - Fuel Conveyor - Lower Plant.  
632 Fuel Conveyor No. 3 - Steam Plant.  
633 Conveyor No. 3 and Sawdust Chute - Steam Plant.

Newbery-Chandler-Millbrook

17 Conveyor - Central Steam Plant - Electrical Plans.

STEAM DISTRIBUTION SYSTEM

J. W. Cunningham & Associates

507 Steam Distribution System - Plan

Sound Construction & Engineering Company

641 Steam Distribution Lines - Profiles.

PINE STATION

J. W. Cunningham & Associates

152 Pine Station - Plans and Details.  
153 " " - Elevations and Sections.  
154 " " - Details.  
155 " " - Interior Details.  
156 " " - Station Maintenance and Utility Shop - Plumbing and Heating.  
207 " " - Station Maintenance and Utility Shop - Electrical Details.

BARBER WH. REPAIR SHOP

J. W. Cunningham & Associates

156-A Garage - Plumbing and Heating.  
207-A " - Electrical Details.  
275 " & Repair Shop - Plans, Elevations & Details.

LAUNDRY BUILDING

J. W. Cunningham & Associates

296 Laundry Building - Foundation Plan - Plumbing and Heating.

OUTLINE OF NARRATION

V. WHOLE AS-BUILT DRAWINGS (Continued)

327	Laundry Building - Plumbing and Heating Plan and Details.
328	" " - Foundation Plan and Sections.
329	" " - Floor Plan and Elevations.
334	Laundry Machine Connections.
325	Laundry Building - Exterior and Interior Details.
327	" " - Electrical Plan and Details.

GATEHOUSE AND FENCE

J. W. Cunningham & Associates

32	Gatehouse - Plan - Elevations - Sections and Details.
330	Fence and Gate - Details.
441	Boundary Fence - Location Map.
430	Boundary Document.

STOREHOUSE

J. W. Cunningham & Associates

36	Storehouse - Plans and Details.
37	" " - Elevations and Details.
45	" " - Plumbing and Heating Plan.
95	" " - Electric Wiring and Fire Alarm System

Sound Construction & Engineering Company

130	Storehouse - Details of Plywood Partition.
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PAINT AND LUBRICATING OIL STORAGE BUILDING

J. W. Cunningham & Associates

76	Paint and Lubricating Oil Storage Building - Elevations and Details.
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GASOLINE STORAGE AND DISTRIBUTION SYSTEM

J. W. Cunningham & Associates

118	Gasoline Storage and Service Details.
233	Gasoline Storage and Distribution System - Plot Plan and Details.

## OUTLINE OF DRAWINGS

### V. RECORD AS-BUILT DRAWINGS (Continued)

357	Gasoline Tank Location.
429	Gasoline Service Station.
435	Gasoline Storage and Distribution System - Electrical Plans.

#### Sound Construction & Engineering Company

345	Weatherproof Distribution Panels for Gas Dis- tribution - Electrical.
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### POWER DISTRIBUTION SYSTEM

#### J. W. Cunningham & Associates

229	Fire Alarm System
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#### Sound Construction & Engineering Company

321	Street Lighting - Power, Telephone and Fire Alarm 200 Area.
322	Street Plan of Hangar and Industrial Area.

#### Newberry-Chandler-Fillmore

22	Underground Conduit and Manholes Contact Lights - Feed to Working Circles.
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### SANITARY SEWER SYSTEM

#### J. W. Cunningham & Associates

42	Sanitary Sewer System - Manholes and Appurtenances
72	" " " " " "
89	" " " " " "
139	" " " " " - Trunk Sewer.
139	" " " " " - " "
200	" " " " " - " "
201	" " " " " - Administration Bldg. Sewer
202	" " " " " - Barracks Sewer.
203	" " " " " - Hangar Road and Bldg.
204	" " " " " - 500' Sewer, Storehouse "1" Sewer.
210	" " " " " - Garage Group.

## OUTLINE OF NARRATION

### V. RECORD AS-BUILT DRAWINGS (Continued)

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200	Storm Sewer - Details.
212	" " - Barracks Area.
213	" " - S.O.Q. Area.
260	" " - Landing Circle.
331	" " - Operations Area.

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235	Grading, Water Mains, Sanitary Sewers, Storm Drains, Power Lines.
237	Composite Plan of Utilities - Operations Area.
238	Grading, Water Mains, Sanitary Sewers, Storm Drains, Power Lines.
239	Grading, Water Mains, Sanitary Sewers, Storm Drains, Power Lines.

### WATER DISTRIBUTION SYSTEM

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13	2 Pipe Line Water Supply, City of Tillamook, Oregon
23	Water Distribution System.
41	Water Supply Line, Pipe Specials.
105	Water Supply Lines, Landing Circle, Ranger A Area, Plan and Profile.
159	16" Water Supply Line.
162	Water Distribution Details.
169	Water Supply Lines, 12" & 16" Steel Pipe Across Runways.
170	Water Distribution Lines, Typical Sections.
211	Water Distribution System, Reservoir Line Plan & Profile.
220	Water Distribution System, Ranger A Section.
221	" " " Ranger S Section.
222	" " " SOQ Section.
224	" " " Mooring Circles 4, 5, 6
225	" " " Reservoir Outlet Line.
228	" " " Hydrant Numbers.
261	Storage Reservoir, Construction Details.

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297	Relocation 5" Water Line, Ranger "B" Section.
344	Water Distribution System, Valve Numbers.
464	750,000 Gals. Reservoir.

CONTENTS OF DRAWINGS

7. RECORD AS-BUILT DRAWINGS (Continued)

ROADS, WALKS AND PAVING

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36	Plan and Profile - Clinic Blvd. "1" Line.
37	" " " " " " " " " " " "
126	Street Plan of Hangar and Industrial Area.
127	Street Profiles - Hangar and Industrial Area.
145	Plan and Profile - Ammunition Road.
215	Road Alignment around Administration Bldg. - Officers' Quarters.
488	Plans - Standard Wooden Walk and Roadside Ditch Bridges.
499	Plan for Roads and Walks - Fire Station Area.

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522	Revision in Walter Reid Street.
569	Apron for Hangar "1" Plot Plan.
575	Plot Plan for Hangar Approaches.
579	Grading and paving - Taxiway #5 - Hangar "2" Apron
612	Street Plan of Hangar and Industrial Area.
616	Grading Plan for Approaches to Hangars.

INERT STOREHOUSE

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408	Inert Storehouse - Plan, Elevations, Sections and Details.
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DOPE STORAGE BUILDING

J. W. Cunningham & Associates

304	Dope Storage Building - Plans, Elevations and Details.
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PIGEON LOFT

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161	Pigeon Loft - Drinking Fountain and Hood Details.
170	" " " " " " " " " " " "
186	" " " " " " " " " " " "



OUTLINE OF NARRATION

1. RECORD AS-BUILT DRAWINGS (Continued)

STATION BRIG

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397	Brig - Plan - Foundation Plan and Details.
398	" - Elevations and Exterior Details.
399	" - Electrical Plan and Details - Plumbing and Heating Plan and Details.

STORAGE GARAGE

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557	Storage Garage.
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HOUSING PROJECT

Sound Construction & Engineering Company

0	Plot Plan Location.	
1	Buildings - Streets and Utilities Layout.	
2	Floor Plan - Elevations - Buildings	1, 2, 3, 4.
3	" " " " "	5, 6, 7, 8.
4	" " " " "	9, 10.
5	" " " " "	11.
6	" " " " "	12, 13, 14.
7	Typical Details	
8	Details of Doors and Windows, etc.	
9	Typical Exterior Framing Details.	
10	Typical Framing Layout.	
11	Typical Interior Framing Details.	
12	Floor Framing Details.	
13	Typical Detail - Sink and Tub in Kitchen.	
102	Footings - Wiring - Plumbing - Buildings	1, 2, 3,
103	Wiring - Plumbing - Footings - "	5, 6, 7,
104	Footings - Wiring - Plumbing - "	9, 10.
105	Wiring - Plumbing - Footings - "	11.
106	Footings - Wiring - Plumbing - "	12, 13, 14.

CONTRACTOR'S TEMPORARY OFFICE BUILDING

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15-T-A-1	Heating Layout - Temporary Office Building.
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OUTLINE OF NARRATION

V. RECORD AS-BUILT DRAWINGS (Continued)

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22	Main Temporary Office Building	
23	" " " "	
24	" " " "	
25	" " " "	
29	" " " "	- Electrical.
31	" " " "	- Plumbing.

MISCELLANEOUS

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14	Property Ownership Map.
533	Map of Air Station Boundary.

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560	Water Lines - Sewer Mains - Fire Protection.
507	Grading, Water Mains, Sanitary Sewers, Storm Drains, Power Lines.
517	Housing Project Site - Y.A.-1 Localizer Station.
560	Plot Plan.

This report is approved by the officer-in-charge of construction.

*O. B. Harvey*  
O. B. Harvey  
Lt., EIC  
officer-in-charge of construction.